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SUMMARY OF RECENT ABSTRACTS*

V. LEISHMANIASIS†

GENERAL

The American Geographical Society (p. 37) has published a map of the world distribution of leishmaniasis, in 6 plates, with a selected bibliography.

HOARE (p. 732) discusses the animal hosts of *Leishmania tropica* (moist form of oriental sore, host the gerbil), *L. braziliensis* (agouti and paca) and *L. donovani* (jackal, fox and dog). He also discusses the reservoir hosts of *Trypanosoma rhodesiense* (antelope probably), *T. cruzi* (armadillo, opossum, dog, cat and probably pig) and *T. rangeli* (dog).

GAUD (p. 257) gives an account of the sandflies of Morocco, with maps of distribution and a key for males and females in his collection (which, however, makes no provision for species previously recorded there but not in this collection). CORRADETTI *et al.* (p. 1324) discuss the diagnostic value of pharyngeal teeth and spermathecae in *Phlebotomus perniciosus* and *P. perfiliewi*.

LAMBORN (p. 733) suggests that non-piercing haematophagous muscid flies (*e.g.*, *Musca* and *Lucilia*) may transmit *Leishmania* by mechanical contamination resulting from intermittent feeding, especially in the region of the buccal and nasal mucosa, the conjunctiva and at lesions produced by piercing flies. In kala azar human mucus and faeces may infect flies feeding upon them. In one experiment leptomonads were found in a fly on the tenth day after an infective feed, and there were pathological changes in the salivary glands.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1956, v. 53. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on leishmaniasis in this series see the June issues of the *Tropical Diseases Bulletin* each year since 1939.

Repeated intravenous injections into rabbits of flagellate forms of various species of *Leishmania* produced immune sera with titres up to 1 in 500 in the case of human parasites, and much higher in the case of a lizard parasite. ADLER and ADLER (p. 38) show that the anti-lizard serum contained agglutinins against several human species. Sera prepared with (non-flagellar) LD bodies showed low titres and the authors think that, after inoculation into rabbits, the antigens may absorb, and become bound to, antibodies within the host cells—or the antigens of the non-flagellar forms may be poor in agglutinogenic power.

VISCERAL LEISHMANIASIS

Epidemiology: Aetiology

A focus of kala azar is present in the Province of Foggia, Italy, where dogs are also affected and *P. perniciosus* is found (especially in houses) along with several other species. CORRADETTI *et al.* (p. 1106) show that oriental sore is not found there though it is present further north.

Kala azar is predominantly a disease of the coastal regions of Yugoslavia, where sandflies are prevalent. CVJETANOVIĆ (p. 167) emphasizes the fact that it is principally a disease of dogs and that it may be controlled by performing the formol-gel test on dogs and curing or killing the reactors before the sandfly season.

PRINGLE (p. 1106) discusses kala azar in Iraq, where foci have been reported in the north and centre. It has not been possible to trace an association with dogs, but the earths of jackals provide suitable environment for sandflies. He gives an account of the species of sandflies taken in various areas; it seems likely that *P. papatasi* is the vector in Central Iraq.

In Africa the distribution of kala azar is wide and erratic and predominantly rural; in Kenya and the Sudan it tends to affect children and young adults rather than infants. KIRK (p. 1229) remarks that the distinctive feature has been the outbreaks in military patrols. Canine leishmaniasis has not been reported in Kenya and the Sudan; post-kala-azar dermal leishmaniasis may provide an ample but inconspicuous human reservoir. He discusses the sandfly vectors and the promising outlook for control by insecticides. Modern treatment is effective. A focus of kala azar in the Baringo district of Kenya is described by MCKINNON and FENDALL (p. 979) who note that the patients inhabited a river valley 3,500 feet above sea level, or other areas of similar level. All the patients were children or young adults; they were fairly widely scattered on a cattle trade route. Sandflies abound but no infected dogs have been found. It is not clear whether this is the beginning of a new epidemic or is an endemic disease of long standing. The recent outbreak of kala azar in the Kitui district of Kenya has been investigated by HEISCH *et al.* (p. 1324), who report that 17 species of *Phlebotomus* have

been taken in the relevant area, including 6 new to science. 8 species bite man, and biting usually occurs near termitaries or in millet fields, and occasionally in houses. Suspicion now falls on the 2 species *P. martini* and *P. vansomerenae* (n. sp.) as vectors of kala azar, but proof is not yet complete.

Kala azar is prevalent in Madras City and has probably increased in recent years. RATHNASWAMY and RAMAKRISHNAN (p. 428) collected 7 species of *Phlebotomus*, including *P. argentipes* (the presumed vector) and *P. papatasi*. Dissection of several hundred failed to reveal leptomomads.

An endemic focus of kala azar in Jacobina, Brazil, is described by PESSOA *et al.* (p. 867).

APPUHN and WEISS (p. 1230) describe what they take to be multiple division of Leishman-Donovan bodies in bone-marrow smears from kala azar in Sudanese patients, but in comment Hoare points out that a similar appearance may be due to imperfect staining of dry specimens in which the parasites have fused, giving the appearance of a single body with numerous nuclei and kinetoplasts which has frequently been misinterpreted as schizogony.

RITTERSON (p. 734) describes the effect of intraperitoneal infection with *L. donovani* in hamsters, on the basis of the weight of the organs, liver nitrogen content, and histopathological changes.

Clinical Findings: Treatment: Control

MONSUR (p. 734) describes a new method of preparing the antigen from Kedrowsky's bacillus for the complement-fixation test for kala azar. This test has proved its value, and the new procedure is relatively simple, and does not involve loss of sensitivity.

JOPLING (p. 39) quotes cases of long incubation period in kala azar. The formol-gel test may be negative in the early stages, and spleen and marrow smears may be negative; suitable culture methods should therefore be carried out.

LI MOLI (p. 868) reports good results in kala azar of children in Bari by treatment with Glucantime [N-methylglucamine antimoniate] in much lower doses (25-30 mgm. per kgm.) than those commonly used, given on alternate days for a single course averaging 20 injections.

An extensive comparative test of several preparations of sodium antimony gluconate (British and Chinese) indicated that this is a drug of great value in the Chinese form of kala azar, disappearance of parasites on sternal puncture being reported by Ho and T'ao (p. 1411) in 94-98% except in one series where the drug was given intramuscularly, and parasites disappeared in 87.5%. Major toxic effects were rare, and minor effects unimportant. Details of dosage and the different courses and preparations used are given in the original abstract. The *Chinese Medical Journal* (p. 39) gives an account of the campaign against kala azar now in progress, in which mass treatment with sodium antimony

gluconate is used, together with insecticidal control of *P. chinensis* the vector. The campaign is proving successful.

A case of agranulocytosis in a patient with kala azar, after treatment with antimony compounds, is described by BRAHMACHARI *et al.* (p. 299).

NAG and GHOSE (p. 561) report a case of kala azar with pulmonary tuberculosis. Streptomycin and PAS were given for the tuberculosis, and pentamidine for the kala azar, but as the patient's condition deteriorated the pentamidine was stopped and urea stibamine was substituted. The patient then improved, but in comment Napier remarks that the improvement may have been a late result of the pentamidine treatment, and that there is a fairly well established opinion that kala azar patients with pulmonary tuberculosis do not do well on pentavalent antimony.

Experiments in hamsters indicate that a single intramuscular dose of pentamidine has no prophylactic effect against subsequent infection with *L. donovani* (WILLIAMSON, p. 300).

AGIUS-FERRANTE (p. 561) reports a great reduction in the incidence of kala azar in Malta in recent years, which he attributes to the anti-sandfly campaign with DDT started towards the end of 1946. The procedure was to spray the dwellings of patients on notification and again later. In comment Napier suggests that this would hardly be enough to account for the reduction in cases, and that the institution of efficient treatment may have been responsible, or that the decrease may have been a natural fluctuation.

CUTANEOUS LEISHMANIASIS

JELLIFFE (p. 40) quotes cases to indicate that cutaneous leishmaniasis is more common in Northern Nigeria and the Western Sudan than British medical literature seems to imply. It is quite often reported in French West Africa.

CITRI and GROSSOWICZ (p. 297) describe a liquid culture medium for the growth of *Trypanosoma cruzi* and *L. tropica*, but it will not support the growth of the other species of *Leishmania* which infect man. This may be a means of distinguishing *L. tropica* from the rest. A culture medium of clearly defined components is described by GROSSOWICZ and CITRI (p. 980); it gave very good growth of *L. tropica*.

VON BRAND and AGOSIN (p. 729) discuss the utilization of Krebs cycle intermediate by culture forms of *L. tropica*.

SMITH (p. 167) quotes a case of cutaneous leishmaniasis with an incubation period of at least 3 years. DOSTROVSKY (p. 1108) discusses the early and late lesions of cutaneous leishmaniasis. The early lesions are granulomatous infiltrations containing abundant leishmaniae, with occasional secondary nodules in lymphatics, and the late lesions are of a chronic inflammatory tuberculoid nature. Although immunity wanes in late leishmaniasis the sensitivity test is usually stronger than in the early forms.

Primary ocular involvement is uncommon in cutaneous leishmaniasis, but PESTRE (p. 1413) has observed that when the infection involves the neighbourhood of the eyelids and lachrymal sac region, secondary pyogenic infection cannot be avoided, and may cause ulcerative changes in the eye itself. The condition is readily diagnosed by pathological examination, and usually responds to treatment.

Some satisfactory results are reported by DUTT and MATHUR (p. 41) in the treatment of oriental sore by radiotherapy. The effect was evidently indirect since examination of smears during treatment invariably showed *L. tropica*.

MUCO-CUTANEOUS LEISHMANIASIS

PIFANO *et al.* (p. 868) give a review of leishmaniasis in Venezuela, where the disease is prevalent in moist and woody zones. Epidemiological evidence suggests that *Phlebotomus panamensis* may be a vector. The authors recommend the skin test with leishmanin for diagnosis because it is simple and highly specific. Tartar emetic and other antimonials offer the only chemotherapeutic possibilities at present.

An outbreak of muco-cutaneous leishmaniasis is reported from Brazil in a community of people making charcoal. NERY-GUIMARÃES (p. 300) relates it to an extensive felling of trees; *Phlebotomus intermedius* was captured inside and outside the dwellings. The area became free from the disease after periodic spraying of the houses with DDT as part of an antimalarial campaign.

FLOCH and CASILE (p. 1108) used the Montenegro intradermal test on patients in French Guiana. It was specific, and was positive in most of those who showed scars of old leishmaniasis and in a considerable proportion of those who did not show scars or had no sign of present disease. The findings suggest that sub-clinical infection is not uncommon.

In Ceará, Brazil, house spraying with DDT has effectively reduced the numbers of *P. longipalpis* (the vector of leishmaniasis) caught in houses, though DEANE *et al.* (p. 980) show that its effect was much less in animal shelters (which were probably of poorer construction and subject to weathering). The spraying had no effect on outdoor populations of *Phlebotomus*, but the reduction effected in houses may reduce the incidence of disease.

COUTINHO (p. 429) attempted vaccination of guineapigs with heat-killed vaccines of *L. enriettii*, *L. braziliensis* and *L. donovani*, challenging with live *L. enriettii* 30 days after the last of 3 or 4 vaccinating doses. In the group vaccinated with *L. enriettii* there was only slight evidence of protection, and with *L. donovani* there was none, but vaccination with *L. braziliensis* showed evidence of cross-immunity against the challenge dose.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control; Animal malaria—monkeys, other animals, birds.

COVELL, G. **Malaria in Ethiopia.** *J. Trop. Med. & Hyg.* 1957, Jan., v. 60, No. 1, 7–16, 1 map & 4 figs. [15 refs.]

The author, who has previously recorded mosquito collections near Lake Tana, carried out malaria surveys during 1955 in Gondar, the Kobbo-Chercher plain, the Awash Valley, Jimma, the Rift Valley lakes and Baco (Omo valley) areas. The altitude of places surveyed ranged from 2,975 to 6,890 feet. His account of epidemiology is based on previous literature and present surveys.

Anopheles gambiae is probably the main carrier of malaria but 7 other species have been suggested as possible supporters. *Plasmodium falciparum* predominates over *P. vivax*, while *P. malariae* does not appear to have been reported. There is little malaria over 6,500 feet altitude, and between 5,500 and 6,500 feet endemicity is usually low but probably severe regional epidemics occur. Below 5,500 feet the intensity of malaria is largely determined by the proximity of breeding places rather than altitude. Malaria is predominantly an epidemic disease, mainly occurring between late September and mid-December though there is some transmission at the beginning of the rainy season. Spleen rates are, in many places, high and the disease is described as commonly "hyperendemic". Malaria control would require the formation of a permanent organization, training of staff, and particularly the improvement of road communications.

G. Macdonald

ALMAZOVA, V. V., PROKOPENKO, L. I., SHESTERIKOVA, A. A. & LEVITANSKAYA, P. B. [The Age Composition and Epidemiological Efficiency of the Population of *Anopheles maculipennis* in 1953–1954 in the Territories of the Altai Region adjoining the Ob River] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 1, 61–70, 2 figs. [In Russian.]

The English summary appended to the paper is as follows:—

"In 1953, effective infection of mosquitoes could take place from June 20 (the beginning of the hatching of the first generation) to July 30, i.e. in the course of 41 days; the average air temperature during the period was 22.2°C and the average duration of the sporogonic cycle during this period was 14.5 days; such a duration was confirmed by detecting oocysts on the mosquito stomachs during the time from June 20 to August 8, 1953. Thus, during the hot season in 1953 more than 1 cycle of *P. vivax* could take place. In 1954, the period of effective infection of mosquitoes could last from July 13 (the first day after the

first dispersion of the second generation when the temperature was 16°C and higher) to August 9, i.e. in the course of 28 days; the average air temperature during this period was 19.1°C, the average duration of sporogony was 24 days. In 1954, not more than one cycle of *P. vivax* could take place.

"The period of possible malaria transmission in 1953 could last from July 5 to September 11, i.e. for 68 days, the transmission being most intensive during the period from July 16 to August 8 (the period when sporozoites were found in the salivary glands of the dissected mosquitoes which had deposited their eggs 3-4 or more times).

"In 1954, transmission of malaria could take place only from August 3 to September 10, i.e. in the course of 38 days.

"Neither the mosquitoes that had hibernated nor the first generation were of epidemiological significance in 1953 or 1954.

"In accordance with different temperatures of the summer seasons in 1953 and 1954, the number of potentially dangerous female mosquitoes per one stable was on the average 253.9, or 9.1 per cent of all the females present in 1953 (the more favourable year) and only 113.9, or 3.2 per cent in 1954.

"The age of mosquitoes during these two years proved to be low; the average physiological age of a gonotrophic female was only one oviposition (when no measures of control were employed).

"The all-round DDT spraying, when a turnover was taking place between the mosquitoes of the given population and those of the neighbouring villages (where no measures of mosquito control were taken), failed to reduce the numbers of the *Anopheles* population, having, however, decreased the number of potentially dangerous females by 4 times and proved to be effective.

"The examination of the salivary glands of the mosquitoes with a view to detecting sporozoites showed that in the conditions of the Altai Region the determination of the sporozoite rate was expedient only of female mosquitoes with four and more enlargements of the ovarian tubes."

See also p. 761, HAMON, Seconde note sur la biologie des moustiques de l'Ile de la Réunion. [**Second Note on the Biology of Mosquitoes in Réunion**]

SNOW, W. E. & SMITH, G. E. **Observations on *Anopheles walkeri* Theobald in the Tennessee Valley.** *Mosquito News*. 1956, Dec., v. 16, No. 4, 294-8, 1 fig.

In the Tennessee valley the larval habitats of *Anopheles walkeri* and *A. quadrimaculatus* are essentially the same but the adult haunts differ so greatly that they are rarely taken together. During 21 years no *A. walkeri* adult has been recorded in routine inspections. *A. walkeri* avoids

barns and other diurnal shelters frequented by *A. quadrimaculatus* during the hot summer months. Small numbers were found in barns in the cooler autumn months after routine inspections terminated. After November no more *A. walkeri* adults were obtained though *A. quadrimaculatus* and *A. punctipennis* were present.

A. walkeri rests on water plants in reservoirs or swamps a few inches above the water level. Night collections give a reliable index to the density. A satisfactory method for detecting the presence of *A. walkeri* and other night-biting mosquitoes is to park a car at sunset facing the breeding site. Headlights are left on for 5 minutes, then turned off, and the doors and windows are opened and the overhead light switched on. Specimens are then collected from the inside surfaces of the car and from the human bait.

Recently the Tennessee Valley Authority's malaria control operations have eliminated many breeding places of *A. walkeri*. The paper concludes with records of the occurrence of *A. walkeri* in the Tennessee River watershed.

H. S. Leeson

CHRISTIE, M. **The Statistical Treatment of the Sporozoite Rate in Anopheline Mosquitoes.** *Ann. Trop. Med. & Parasit.* 1956, Dec., v. 50, No. 4, 350-54, 1 diagram.

An expression is quoted to connect the true sporozoite rate with the number of infected individuals discovered during examination of a sample of the whole. From this a tabulated example is worked to show the divergence from the true value which may be found when a small number of mosquitoes is examined. Normally only the observed rate is known and the worker desires to estimate the confidence with which he can assume that the true rate lies within certain points. To do this he must refer to the *Statistical Tables for Biological, Agricultural and Medical Research* by FISHER and YATES (1948, 3rd Edition, Edin., Oliver and Boyd) and in the present paper he is told how the tables in that work may be used for this purpose.

G. Macdonald

ZATZ, I. Transmissão da malária pela transfusão de sangue. Pesquisa experimental em receptores com paralisia geral progressiva. [**Transmission of Malaria by Blood Transfusion. Study in Patients with General Paresis**] *Arquivos dos Hospis. Santa Casa de S. Paulo.* 1956, Mar., v. 2, No. 1, 81-4. English summary.

While ACKERMAN and FILATOV [this *Bulletin*, 1934, v. 31, 459] were not able to obtain transmission of malaria with malarial blood stored for 5 days or more at 4°C., ANTSCHELEWITSCH [*ibid.*, 1938, v. 35, 38] reports a case in which transmission occurred after 8 days' storage. The present author, in São Paulo, Brazil, used a different preservative solution, which he calls ACD (sodium citrate, 13.2 gm., citric acid, 4.7 gm.,

glucose, 30 gm., distilled water, 1,000 cc.). The malarial blood, obtained from heavily infected patients, was stored at 4°C. and at various intervals was injected intravenously into patients with general paresis for whom malaria therapy was indicated. Mixed *P. vivax* and *P. malariae* forms were used. The results for the 26 patients are tabulated. Up to 6 days of storage the blood was infective for all of 9 patients, 2 out of 3 were infected with blood stored for 7 days and 1 of 3 with blood stored for 8 days. The remaining 11 patients given blood stored for 9 to 11 days did not become infected. The incubation periods varied from 10 to 42 days and averaged 20 days. The shorter the period of storage at 4°C. the longer did the plasmodia persist in the patient's blood.

H. J. O'D. Burke-Gaffney

TIBURSKAYA, N. A. [**One-Day Method of Treatment of the Acute Phase of Tertian Malaria**] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 1, 42-8. [In Russian.]

The English summary appended to the paper is as follows:—

“A combination of cycloquine and plasmocide [pamaquine] (in daily doses of 0.3 and 0.06 respectively, for 3 days) was administered to 12 patients suffering from tertian malaria. On an average the parasites disappeared from the peripheral blood in 2.8 days; the temperature became normal in 1.6 days after the beginning of the treatment. Relapses were registered in 4 cases out of 12.

“A combination of cycloquine and chloridine in doses of 0.3 and 0.05 respectively in the course of one day was administered to 13 patients. On an average the parasites disappeared from the peripheral blood in 2.2 days; the temperature became normal in 1.3 days. Relapses were registered in 3 cases out of 9.

“Cycloquine in combination with chloridine in daily doses of 0.6 and 0.1 respectively divided in two portions was administered for one day to 83 patients. On an average the parasites disappeared in 2.4 days; the temperature became normal in 1.1 days after the beginning of the treatment. Relapses were registered in 10 cases out of 55.

“One-day treatment with cycloquine and chloridine followed (after one day when no drug was administered at all) by a 10-day course of treatment with quinocide in doses of 0.03 a day, proved to be highly effective for radical cure of tertian malaria. 24 patients observed in the course of 8 months to 2 years did not have any relapses of the disease.”

RUSSELL, P. F. **World-Wide Malaria Distribution, Prevalence, and Control.** *Amer. J. Trop. Med. & Hyg.* 1956, Nov., v. 5, No. 6, 937-65. [36 refs.]

Information is given on the status of malaria for most countries of the world outside the Iron Curtain and data from them are classified in

12 areas. They include the total population, that exposed to malaria, the number protected from malaria, and some information on the nature of the vector and the form of recent control. The analysis shows that in the following areas over half the exposed population are protected: North America, the West Indies, South America, Europe and the Near East. In some other areas the proportion protected approaches half: in northern and north-eastern Africa 41%, in South Africa 32%, and in middle Asia including India 34%. However, in others the proportions protected are considerably lower: in Arabia 11%, in central and west Africa 9%, in east Africa 4%, in far east Asia 12% and in Australia and Oceania 6%. In the whole area reviewed 1,070 millions are exposed and of them 375 millions or 35% are protected. The author concludes that despite the great acceleration in the attack on malaria the sun has not yet set on the disease, and its control still remains an exceedingly large task requiring both research and action on a higher scale than before. Some of the principal needs in wider campaigns are then briefly listed.

G. Macdonald

LOZANO MORALES, A. **Administrative and Economic Aspects of Spanish Malaria Control Legislation.** *Bull. World Health Organization.* Geneva. 1956, v. 15, Nos. 3, 4 & 5, 834-7.

The economic and administrative system applied in Spain since 1949 for the control of malaria is perhaps unique. For a long time the technical direction and financing of public health measures has been regarded as a duty of the State, and it was considered that a single national organization was required for its effective operation. As early as 1944 health legislation had provided for disinsection and the sanitation of malarious regions, and the cost of the campaigns was borne by the State. The regulations also covered the use of antimalarial drugs, and referred to the payment of costs by private individuals and estate owners. In practice this last provision is rarely applied owing to the difficulty of implementation, and normally drugs are supplied free.

Although protection of man was the objective of vector and malaria control, extensive agricultural and economic improvement has resulted. This is recognized by the public, who willingly provide the necessary finances. The cost is borne not only by the people directly affected but by the whole community indirectly benefited. In Spain there are three types of community, *viz.*—the villages, rural zones forming a defined community, and the agricultural estates engaged in single-crop farming under a public corporation. In the villages a municipal official accompanies the control team and records the work done, on the basis of which the local authority divides the cost proportionately among the inhabitants. In the rural zones the director of the team estimates the cost of the work for each property and the authority collects from them the sums due.

When there is a body regulating the production cycle of a single-crop farming, this body is responsible for collecting the costs. The poor are not required to pay, and a corresponding allowance is made to the municipality. The funds collected are thus managed either by the central or provincial services. Private persons or municipalities may be authorized to carry out disinsection but the official services retain control of such operations. In spite of the division of responsibility between provincial and national services, malaria prophylaxis is regarded as essentially a matter of national concern and hence all programmes are being integrated with the national plan, and are supervised centrally. A public declaration is required before any area is compulsorily sprayed and charged for the work.

With this organization very satisfactory results have been achieved at low cost by the use of chlorinated insecticides in the hyperendemic areas and antimalarial drugs distributed through dispensaries in order to eliminate residual infection.

T. H. Davey

FARID, M. A. Implications of the Mecca Pilgrimage for a Regional Malaria Eradication Programme. *Bull. World Health Organization*. Geneva. 1956, v. 15, Nos. 3, 4 & 5, 828-33.

Malaria is a disease of very long standing in Saudi Arabia. Three vectors have been reported. *Anopheles gambiae* is present in Mecca, Medina and Jeddah, and in the valleys of the coastal plain; it occurs profusely in pools during the rains and perennially in springs and shallow wells. *A. sergenti* is present in Medina and in the valleys and is the main vector, biting out of doors, in the northern half of the country. *A. stephensi* is the main vector in Al-Hasa province. Thus pilgrims from northern countries travelling through Saudi Arabia on inland routes during the malaria transmission season are liable to infection before reaching Mecca.

In 1952 a malaria control project was initiated to protect the inhabitants of Jeddah, Wadi Fatma and Mecca. In 1956 the spleen rate in 620 Jeddah schoolchildren was 4%. Similarly, in a number of villages spleen rates which were between 42% and 81% in 1952 had dropped to between 3% and 6% after 3 years' control by annual spraying with DDT. Malaria, however, is still highly endemic north of the valley of Wadi Fatma, which is outside the zone of control, and in Medina, where control is planned to begin within 2 years. Further expansion of control is intended.

During the 25 years commencing in 1958 the pilgrimage to Mecca will take place during the malaria transmission season. Many of the pilgrims will be coming from countries where eradication is in progress or projected, and they will probably become foci of transmission on their return home. The surveillance organization of their countries of origin must

give consideration to this problem. In addition, anophelines may be transferred to neighbouring countries, and this would include *A. stephensi* which is now DDT-resistant in Saudi Arabia. T. H. Davey

GUNARATNA, L. F. **Recent Antimalaria Work in Ceylon.** *Bull. World Health Organization.* Geneva. 1956, v. 15, Nos. 3, 4 & 5, 791-9, 1 map.

A brief account is given of the history and present status of malaria control in Ceylon. Residual spraying was started in 1945 with DDT at a dose of 100 mgm. per square foot every 6 weeks. The dosage was reduced in 1950 to 50 mgm. per square foot and the spraying interval was gradually increased until in 1952 it was 12 weeks. Spraying was discontinued in one area of the epidemic zone in 1951 and progressively in this and other areas until 1955 when only development areas in the jungle were being sprayed. A vigilance organization carried out extensive larval and adult vector surveys and studied weekly malaria morbidity returns from all the medical institutions. This work was expanded as spraying was discontinued. In the epidemic zone the emphasis was on vector control, but vigilance staff also visited medical institutions fortnightly and made blood films from all persons attending with fever. In the dry zone the emphasis was on the detection and treatment of cases because vector control was impracticable in areas of shifting cultivation. Here vigilance staff were each responsible for 2 to 4 medical institutions which they visited in rotation for periods of 1 to 4 weeks, taking blood films from all persons with fever. Infected persons were treated at home with Camoquin [amodiaquine] in dosage of 600 mgm., 400 mgm. and 400 mgm. on 3 successive days, in combination with primaquine 15 mgm. daily for 5 days in *Plasmodium falciparum* infections and for 14 days in other forms of malaria. Treatment and spraying were started simultaneously when foci of transmission were discovered, blood films were taken from all persons in the focus and those infected were treated. Such foci were visited monthly thereafter and sprayed every 3 months.

In a review of the malaria situation in 1955 it is reported that 7,317 cases of malaria were diagnosed clinically; blood films from 3,260 of these were positive in only 7.1%. Reported deaths from malaria numbered 66 and among 33 investigated only one was regarded as due to malaria. [The table of annual returns, however, records 268 reported deaths from malaria.] Blood films from 107,805 persons yielded 3,874 positives. An analysis of 93,299 of these films showed 2.2% positive; 7.1% of persons clinically diagnosed as suffering from malaria were positive as were also 2% of persons not so diagnosed.

The annual *per caput* cost of control operations was 0.34 rupees.

T. H. Davey

SHAMA SASTRY, H., SITARAMAN, N. L. & RAMA RAO, T. S. **Effect of Insecticides on Vector Species and Development of Resistance, if any, in Different Vector Species in Hiriyur Area, Mysore State.** *Indian J. Malariology*. 1956, Dec., v. 10, No. 4, 349-56, 1 graph.

The Hiriyur area of Mysore State has been sprayed over 4 years with DDT (9 times) and gamma BHC (twice) to control *Anopheles culicifacies*, *A. fluviatilis* and *A. stephensi*. Susceptibility to DDT after this period was high for all 3 species 24 hours after a one-hour exposure to filter papers sprayed with 0.5%, 1.0% and 2.0% concentrations of DDT (100% mortality for the first two species, and about 70% mortality for *A. stephensi*). Experiments with *A. culicifacies* from an untreated village give no suggestion of resistance in this species in Hiriyur. The data for the other two species are inadequate to test this point; the paper supposes that the same holds good for *A. fluviatilis* but comes to no conclusion for *A. stephensi*.

D. S. Bertram

AYURAKITKOSOL, L. & GRIFFITH, M. E. **The Developing Antimalaria Vigilance Programme in Thailand.** *Bull. World Health Organization*. Geneva. 1956, v. 15, Nos. 3, 4 & 5, 799-805.

Intensive malaria control began in Thailand in 1949 and has now been established in 60 of the 71 provinces so that almost all the malarious areas are protected. The vector is *Anopheles minimus* and it is being controlled by house spraying with DDT at 2 gm./square metre once a year. Progress is assessed by surveys during the wet season and transmission usually is found to cease after about 3 years' control. Criteria for the discontinuance of spraying and the institution of vigilance against recrudescence are: the absence of *A. minimus* from houses and in typical breeding places; a zero parasite rate in infants; a parasite rate below 1% and a spleen rate of under 10% in children aged 2 to 9 years; the area must be surrounded by controlled areas or otherwise protected against introduction of malaria.

As a result of applying these criteria spraying was stopped in areas with a population over 3,000,000, an additional half million are under vigilance and some 7,000,000 still are subject to house spraying. Spraying was restarted in certain small areas as a result of findings higher than those required by the criteria. Vigilance procedures consist in inspection of houses for anophelines, dissection of anophelines, larval surveys, spleen and blood examinations of children and blood examinations of infants. The survey teams also distribute antimalarial drugs and provide information to the public.

The scale of spraying increased steadily until 1956 but will now decrease steadily and by 1961 more than 90% of the malarious areas will be under vigilance alone. The annual surveys will be carried on for about 3 years in areas where house spraying has been discontinued and likely foci of recrudescence will receive special attention. Eventually the

antimalarial activities will be taken over by the provincial health services. Diagnostic facilities will need to be expanded and this is being organized. A difficult problem will be the protection of migrants, either shifting cultivators or pilgrims; special spraying schedules or suppressive treatment will be used. The cooperation of neighbouring governments is being sought in an attempt to prevent reimportation of the disease over frontiers.

T. H. Davey

CH'EN, C. T. & LIANG, K. C. **Malaria Surveillance Programme in Taiwan.** *Bull. World Health Organization*. Geneva. 1956, v. 15, Nos. 3, 4 & 5, 805-10.

Since 1953 the whole island has been sprayed three times and two more sprayings were planned for 1956 and 1957 when it was intended that vector control should cease. Malaria, which was a major disease, has now been reduced to a minor public health problem by insecticidal control of *Anopheles minimus minimus*. The spleen rate has been lowered from 25.5 in 1953 to 11.7 in 1955, and only 8 positive blood films from 2 foci were found in over 63,000 infants examined. Since it was unlikely that malaria would be eliminated by 1957, a surveillance organization was introduced in 1955 and it was proposed to extend this to cover the whole island in 1956. This organization will continue to function until eradication has been achieved.

For purposes of surveillance the island is divided into 3 regions, representing the former hyperendemic, mesoendemic and hypoendemic zones. Foci of transmission are now rare, and elimination of residual malaria is being undertaken by active search for sources of infection. Suspected malaria cases at medical institutions are examined and those found positive are treated. In the hypoendemic area no surveillance personnel are posted, but medical practitioners are required to report malaria infections. In the former malarious zones each of the 139 surveillance units planned for 1956 was instructed to examine all infants in a population of 5,000 to 6,000 in the most malarious parts of the township. The presence of *Plasmodium falciparum* in a controlled area is regarded as an indication of a focus of transmission, since it generally dies out within a year of cessation of transmission. An attempt is made to find the source of infection if malaria parasites are detected in infants or *P. falciparum* in other age-groups. If transmission is found or suspected re-spraying and mass treatment are immediately undertaken. The surveillance units attempt to discover malaria infections by investigating cases of fever discovered by chance while doing infant surveys, and in addition blood films are examined from cases of malaria diagnosed clinically or reported by the teachers in primary schools. Malaria parasites were detected in 4.33% of 6,075 clinically diagnosed cases and it is believed that examinations of cases of fever are likely to indicate residual infection better than mass surveys of the general population.

T. H. Davey

METSELAAR, D. **A Pilot Project of Residual Insecticide Spraying in Netherlands New Guinea, Contribution to the Knowledge of Holo-Endemic Malaria.** [Thesis.] 128 pp., 1 map & 16 figs. [Numerous refs.] 1957. Leiden. Copies may be obtained from Kemink & Son, Domplein 2, Utrecht, price 16s.

This survey of malaria and the possibility of its control in Dutch New Guinea is unusually penetrating. It gives a full account of the main vectors: *Anopheles punctulatus*, *A. farauti* and *A. koliensis*, their feeding habits and common hosts, breeding, resting and flight habits, the frequency of infection in them, their flight range, abundance, longevity and other characteristics. There are also briefer statements of the 10 other species of anophelines recorded. Experiments on huts equipped with window traps showed that applications of 2 gm. per m² of DDT caused a mortality of 89%, 87%, 69%, 62% and 67% in successive 6-weekly periods after application, while an emulsion of dieldrin applied in a final dose of 0.5 gm. dieldrin per m² gave mortalities of 100%, 100%, 78%, 47% and 55% in the same periods.

A detailed malaria survey of an area near Sentani lake in the south-west of Hollandia preceded a pilot control project in which DDT was applied in a dose of 2.4 gm. per m² at intervals of 6 months to all houses within an area containing about 6,600 population, on whom the surveys were continued for 2 years. About half of this area was classed as holoendemic and half as mesoendemic. After 2 years the parasite rate in children under 1 year of age in a holoendemic area fell from 29/67 to 4/150 and in the mesoendemic area from 39/73 to 3/128, though the fall in the age-group 1-2 years was less satisfactory. There was some fall in the spleen and parasite rates of older children though this was not great. It was, however, recorded that heavy infections among them were much fewer and the parasite load they carry was greatly reduced. Dissection of 1,851 anophelines in the control holoendemic area revealed sporozoites in 4, or 0.2%, the previous rate having been 1.2% and that in an uncontrolled holoendemic area being 1.3%. This together with the parasite rate showed that transmission had been greatly reduced but not stopped. In the holoendemic area the death rate fell from 37 to 23 per 1,000 and in the mesoendemic area from 22 to 19, while in the first the number of infant deaths in 1 year fell from 14 to 3, and in the second remained stationary at 6. Elaborate measurement of the height, weight and general health of infants and children in the 2 areas are recorded, showing some improvement in the weight curve of those in the holoendemic zone.

The author concludes that complete interruption of transmission was not secured and might not be possible in this area by these means, though it could possibly be achieved by the concurrent use of drugs. He includes a discussion on the classification of malaria, pointing out that in one of the districts studied the intensity of transmission is fully equal to that in any other described as holoendemic, but that the spleen rate does not decline in adult life as is required by the strict definition made

in Africa, and which cannot therefore be considered as generally applicable.

[This detailed and lucid survey adds considerably to knowledge and deserves study in the original by those concerned in Australasian conditions as well as in the general theory of malaria control.] [See also this *Bulletin*, 1956, v. 53, 154.] *G. Macdonald*

METSelaar, D. **A Pilot Project of Residual-Insecticide Spraying to control Malaria transmitted by the *Anopheles punctulatus* Group in Netherlands New Guinea.** *Amer. J. Trop. Med. & Hyg.* 1956, Nov., v. 5, No. 6, 977-87, 2 figs. [14 refs.]

This paper describes the pilot project of which an account is given with ample supplementary material in the paper reviewed above.

GABALDON, A. **The Time required to reach Eradication in relation to Malaria Constitution.** *Amer. J. Trop. Med. & Hyg.* 1956, Nov., v. 5, No. 6, 966-76. [12 refs.]

The constitution or condition of malaria, previously described [this *Bulletin*, 1950, v. 47, 4], is displayed by two ratios of endemicity and epidemicity, based on the lowest spleen rate found in 5 years and the degree of variation of the rate during that period. Data on these ratios are available for the area of Venezuela from which malaria has been eradicated [*ibid.*, 1955, v. 52, 437]. Municipalities can therefore be classified into 3 groups with high endemicity and epidemicity, with low endemicity and high epidemicity, and with both low endemicity and low epidemicity. Records show that the reservoir of malaria was virtually eliminated after 4 years of spraying in municipalities of the first type, after 3 in those of the second, and after 2 in those of the third. The control of malaria carried by individual vectors is reviewed; that transmitted by *Anopheles darlingi* has taken the longest time to eradicate. Difficulty was also encountered with malaria transmitted by *A. aquasalis* and *A. nunez-tovari* which bite and rest out of doors and are not affected by residual spraying. Malaria carried by the second of these may present difficulties elsewhere. *G. Macdonald*

FLOCH, H. **Influence de la lutte antipaludique sur la natalité, la mortinatalité et la mortalité infantile en Guyane française.** [The Effect of Antimalarial Measures on the Birth Rate, Stillbirth and Infant Mortality Rate in French Guiana] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 647-51, 2 graphs.

The decrease in malaria in French Guiana following the widespread use of DDT as an insecticide has caused a noticeable improvement in the ratio of live births to deaths. Curves for Guiana and Cayenne show a

rise in the vital index beginning in 1948 and still continuing to rise in 1955. The influence on the stillbirth rate and on the infant mortality rate is more difficult to assess.

The infant mortality rate in Cayenne fell during the years 1947 to 1949 but after a slight rise from 1949 to 1950 the curve shows a steady subsequent fall from 90 per thousand live births to 52 per thousand. There was a less marked decrease in the stillbirth rate. The removal of the influence of malaria on the earlier stages of pregnancy is not reflected in the stillbirth rate but probably in the increased birth rate.

Frederick J. Wright

BRAY, R. S. **Studies on Malaria in Chimpanzees. I. The Erythrocytic Forms of *Plasmodium reichenowi*.** *J. Parasitology*. 1956, Dec., v. 42, No. 6, 588-92.

Plasmodium reichenowi was studied in chimpanzees in Liberia, as natural infections, or after inoculation of infective blood, and following splenectomy. In intact animals rings and gametocytes only were found, except during high parasitaemia when a few schizonts appeared (in the presence of high fever). Removal of the spleen changed the picture: a fortnight later parasites became more numerous, and after 3 weeks, parasitaemia rose sharply and attained half a million per cmm. The density remained high and similar numbers were found in a recrudescence when the infection was controlled with sulphonamides. The most striking feature of the attack was the appearance of numerous solid parasites and schizonts.

The morphology of *P. reichenowi* is described. Little growth of the ring form occurs for 24 hours, when the nuclei of half the parasites apparently split into 2 or more fragments (this is an artefact, as proved by wet fixation of similar forms in *P. falciparum*) which unite to form a single nucleus prior to schizogony. The early forms are often *appliqué* and later forms are often *tenue*. Pigment suddenly appears as a single black mass about the 36th hour. The cytoplasm stains an intensely bright blue colour, because it is pure and not interspersed with minute grains of pigment. The mature schizont occupies one-quarter to two-thirds of the corpuscle, measuring 5-6 μ and containing 6-16 merozoites (typically 12) each of which measures 1.2-1.9 μ in diameter. Immature and mature crescents of both sexes were seen and these resembled the gametocytes of *P. falciparum* except that lozenge and spindle forms were absent.

The infected erythrocyte is unchanged for 15 hours, then it becomes brassy in colour and Maurer's clefts appear about the 26th hour; later the colour of the stained cell deepens to pink. Occasionally the contour of the cell is mammilated and by 40 hours this appearance becomes intensified with the disappearance of the clefts and general distortion of the erythrocyte.

Although this study revealed no pronounced morphological differentiation between *P. reichenowi* and *P. falciparum*, the author thinks that the host specificity validates their specific status. *P. C. C. Garnham*

FABIANI, G. & ORFILA, Jeanne. Le paludisme expérimental du souriceau. Influence de l'allaitement maternel. [**Experimental Malaria in Suckling Mice: the Effect of Mother's Milk**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 705-13, 4 figs. [21 refs.]

The authors describe experiments designed to determine whether the course of malarial infection in suckling mice was influenced by the mother's milk. For this purpose 50 mice were inoculated intraperitoneally with *Plasmodium berghei* at different periods, between the ages of 1 and 17 days, and observations were made on their weight, size, parasitaemia and percentage of reticulocytes. It was found that the general course of the infection was the same as in adult mice and likewise terminated in death. There was also retardation of growth and loss of weight in the young animals. The effect of the mother's milk was studied in sucklings inoculated with doses of parasites which were large enough to suppress the incubation period. In such cases a marked drop in parasitaemia was observed in mice infected at the ages of 8 and 11 days, although the number of reticulocytes susceptible to infection remained high. However, no such improvement was noted in animals inoculated with small doses of parasites. The milk had also no effect on most of the younger sucklings inoculated between the ages of 24 hours and 5 days. The antimalarial effect of the milk diet lasted only as long as the young mice were fed by the mother and disappeared by the 20th day, when they were weaned. [See also this *Bulletin*, 1956, v. 53, 155.]

C. A. Hoare

SYRKINA-KRUGLAK, S. A. [**A Study of the Antimalarial Effect of some Alkaloids in Infections caused by *Plasmodium gallinaceum* and *Plasmodium berghei***] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 1, 54-8. [11 refs.] [In Russian.]

The English summary appended to the paper is as follows:—

“Chlorhydrate of the sum of alkaloids isolated from *Hydrangea cinerea* and *Hydrangea hortensis* is twice less active than quinine (Chlorhydrate) against the erythrocytic forms of *P. gallinaceum*; no effect on the exoerythrocytic forms of the plasmodium was noted.

“Pure crystalline alkaloid No. 1 from *H. hortensis* is approximately twice as active as quinine in chickens with blood infection caused by *P. gallinaceum*. The toxic effect of this alkaloid is greater than that of quinine.

“The amorphous alkaloid No. 2 and the amorphous sum of alkaloids from *H. hortensis* are less active than quinine in the case of *P. gallinaceum*. Alkaloid No. 2 when compared with crystalline alkaloid No. 1 is less toxic.

"In the case of *P. gallinaceum* and *P. berghei* infections, alkaloid C from *Choisya ternata* proved to be of little effect.

"Alkaloids A and B from *Choisya ternata* as well as synomenine isolated from *Menispermum dahuricum* did not produce any effect when tried on chickens and mice."

[See also this *Bulletin*, 1954, v. 51, 468.]

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—human, animal; American—Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

COLLOMB, H., GALLAIS, P. & PLANQUES, L. La trypanosomiase chez l'Africain transplanté. [**Trypanosomiasis in Emigrant Africans**] *Bull. Soc. Path. Exot.* 1956, Sept.–Oct., v. 49, No. 5, 900–910. Discussion 910–12.

Signs of trypanosomiasis not uncommonly appear in Africans several years after they have emigrated from trypanosomiasis endemic areas. 27 such Africans have been closely studied 3 or 4 years after leaving Africa; 22 of them were proved to be suffering from trypanosomiasis by the recovery of parasites, while the remaining 5 had clinical evidence highly suggestive of the disease. The periods elapsed between their departures from Africa and the appearance of recognized symptoms and signs overseas were: 4 years in 4 cases; 3 years in 10 cases; 18 months to 2 years in 8 cases; and 1 year or less in 5 cases. Of the 27 patients 23 (85%) were then manifesting signs of the disease for the first time. In 13 instances the initial manifestations were neuropsychic; in the other 14 there was some antecedent ill health. Parasites, where recovered, sometimes were found only in very small numbers and after much search, by gland puncture and lumbar puncture.

Whatever may have been the reason for the delay in the appearance of manifestations of the disease in these cases, the host-parasite equilibrium eventually did break down. Bacterial and virus infections in particular seemed to have precipitated the breakdown; and physical fatigue, nutritional deficiencies, intercurrent infections, and psychological stresses also may contribute to it.

In discussion DE MARQUEISSAC recalled that 24 years earlier [this *Bulletin*, 1932, v. 29, 636] he had directed attention to the parasitological latency which suddenly and unexpectedly might occur in untreated human cases of trypanosomiasis. He gave details of such a case, and cited further records to emphasize this fact and its implications.

A. R. D. Adams

ORMEROD, W. E. **The Adaptability of Trypanosomes.** Reprinted from *Biol. & Human Affairs*. 1956, Oct., v. 22, No. 1, 5 pp., 4 figs.

The author gives a short popular account of the trypanosomes, their host-parasite relations and biology, with special reference to their adaptation to conditions acquired in the course of evolution.

C. A. Hoare

INOKI, S., OSAKI, H. & NAKABAYASHI, T. **Studies on the Immunological Variation in *Trypanosoma gambiense*. II. Verifications of the New Variation System by Ehrlich's and *in vitro* Methods.** *Med. J. Osaka Univ.* 1956, Sept., v. 7, Nos. 1/2, 165-73, 1 fig. [17 refs.]

In previous papers [this *Bulletin*, 1953, v. 50, 394] it was demonstrated that in mice inoculated with relapse strains of *Trypanosoma gambiense*, followed by human serum, the succeeding relapse strain was identical with the original (initial) strain, and the phenomenon represented a reversal.

The present study was devoted to the elucidation of the mechanism governing antigenic variation in relapsing strains of *T. gambiense*. The authors consider two possible interpretations of this phenomenon: either it is due to changes induced directly by the action of antiserum (Ehrlich's concept), or to selection of mutants (Levaditi's concept). The change of antigenic type was observed by exposing relapse strains from infected mice to antiserum in a mixture of parasite suspensions and antiserum in bulk and—in various dilutions—in drops on slides: in both cases kept at 37°C. The initial and resulting antigenic types were determined by the agglomeration test.

It was shown that in tests by the first method (Ehrlich's) exposure of the trypanosomes to serum for 30 minutes caused a change from the relapse to the original antigenic type, which persisted through 200 mouse passages. However, in tests by the second method the change of antigenic type could be observed already after exposure for 8-15 minutes.

It is concluded that this hereditarily fixed modification is induced by the direct action upon the trypanosomes of the environmental factor represented by the antiserum, and not by mutation.

C. A. Hoare

WILLETT, K. C. **The Problem of *Trypanosoma rhodesiense*, its History and Distribution, and its Relationships to *T. gambiense* and *T. brucei*.** *East African Med. J.* 1956, Dec., v. 33, No. 12, 473-9, 3 graphs.

In this paper the author sets out to trace the relationship of *Trypanosoma rhodesiense* to the allied species, *T. gambiense* and *T. brucei*. From a comparison of the differences between the characteristics of *T. rhodesiense* and *T. gambiense*—the chief of which are virulence, presence of posteronuclear forms, response to arsenicals and to trypanocidal action of human serum—it is evident that the majority of strains have well-defined differential characters of one or the other species, although

strains with intermediate characters are present in both. However, the most constant distinguishing feature of the Gambian and Rhodesian forms of sleeping sickness is the occurrence of the former in areas where tsetse of the *palpalis* group are prevalent, whereas the latter is found in areas of the *morsitans* group. In the author's opinion, the species of trypanosome—and consequently the type of disease—in a given locality is determined by the species of *Glossina* found in the area in question. This connexion between the species of trypanosome and vector finds support in the geographical distribution of the two forms of sleeping sickness.

The author has also demonstrated that the higher the dose of metacyclic trypanosomes inoculated the shorter the incubation period of the infection in the host. He also found that *G. pallidipes* administered a considerably larger dose than *G. morsitans* and *G. swynnertoni*, while that inoculated by *G. palpalis* was the smallest. Hence, it is argued, the virulence of the trypanosomes is raised by transmission through flies of the *morsitans* group and lowered when transmitted by those of the *palpalis* group. From the available evidence it is inferred that *T. rhodesiense* might have originated from a trypanosome [presumably *T. gambiense*] introduced into an area where its virulence was increased by transmission through local *G. pallidipes*.

The relation of *T. rhodesiense* and *T. brucei* is obscure, for, on the one hand, there is no evidence that the latter may be transformed into the former, and, on the other, it is known that *T. rhodesiense* retains its infectivity to man after prolonged cyclical passages through ruminants. There is, however, strong circumstantial evidence that the Rhodesian disease is a zoonosis, with game animals acting as reservoir hosts.

C. A. Hoare

MAILLOT, L. Présence de *Glossina medicorum* Austen, 1911 au Gabon (Afrique Equatoriale Française). [**Presence of *Glossina medicorum* in Gabon, French Equatorial Africa**] *Bull. Soc. Path. Exot.* 1956, Sept.-Oct., v. 49, No. 5, 823-7, 1 fig. [16 refs.]

Glossina medicorum, until recently considered a rare species, is recorded from French Equatorial Africa; apart from 2 records which were more southerly this is its most easterly occurrence to date. The record is based upon a single male and female, taken in separate forested regions. Literature relating to the distribution, ecology and role of *G. medicorum* in trypanosomiasis is briefly discussed.

N. R. Phillips

GLASGOW, J. P. **The Food of Tsetse.** *East African Med. J.* 1956, Dec., v. 33, No. 12, 467-72.

The author discusses some of the problems of determining the food of tsetse flies. Man is not the preferred host of any species. In East Africa

Glossina morsitans, *G. swynnertoni* and *G. palpalis* transmit most sleeping sickness. *G. pallidipes* was locally important as a vector in Busoga, Rhodesia, in 1943 and also may be implicated in the present transmission of sleeping sickness in Central Nyanza, Kenya. As some species of tsetse are attracted more readily to man, these species are more easily captured. Captures of tsetse show an unequal sex ratio with a preponderance of males (80% or more), despite the greater longevity of the females. A study of the blood meals is based mostly on male captures. Captures of engorged specimens are rare. Males of *G. swynnertoni* feed once every 3 days and remain recognizably engorged for one day. Consequently one-third of the captured males may be expected to contain blood. Actually only about one-hundredth of the captured males have recently engorged. This may indicate that samples of male tsetse captured for blood meal determinations are biased in the sense that only males which have had a certain type of meal are captured.

Identification of blood meals is also not easy. At Shinyanga a number of host animals were exposed to biting tsetse. Biting flies on the same host were marked with the same colour, so that when the flies were recaptured on the following day the host could be identified. The blood meals were then sent to the Lister Institute for identification. Out of 34 meals, 23 were correctly identified to species, 6 were mistakenly identified and 5 were unidentified or correctly identified only to species group.

Despite these difficulties it is possible that a large proportion of the meals of some species come from certain types of host. *G. palpalis* is found frequently to have fed on crocodiles. A small colony of this tsetse established at Shinyanga around a pool fed largely on a small tortoise inhabitant. The meals were identified from the presence of a specific parasite. As the tortoise was not easy to find it is reasonable to conclude that *G. palpalis* seeks out and feeds mostly on reptilian hosts.

A large number of meals identified from *G. morsitans* and *G. swynnertoni* indicate that the warthog is a preferred host. The author points out that these species of tsetse can probably maintain themselves equally successfully on other hosts, and that destruction of the apparent preferred host is not a method of tsetse control. He cites the case of *G. pallidipes*, which has been supposed to depend on buffalo for food, but which in Kenya has been found in numbers, in the absence of buffalo, feeding mainly on bush-buck, bush-pig and duiker. B. R. Laurence

LEGRAND, J., EVENS, F. & LAMBOTTE, C. A propos d'un cas de trypanosomiase chez un nourrisson traité à l'Arsobal. [**Trypanosomiasis in an Infant treated with Arsobal**] *Ann. Soc. Belge de Méd. Trop.* 1956, Oct. 31, v. 36, No. 5, 577-80.

In 1951 an African child of 2 months, on examination of blood by the thick film method, was found to have a malignant tertian malaria

infection. The child continued to suffer from recurrent sore throat, an upper respiratory infection, and slight fever. The tuberculin test was negative and the general condition remained very good. Six weeks after first being seen he had convulsions; on re-examination there was moderate enlargement of the spleen and some anaemia. The fontanelle appeared to be tense but there was no neck rigidity. A lumbar puncture yielded a fluid containing numerous cells and trypanosomes, with the associated chemical changes. Ventricular puncture yielded a fluid with a normal cell count which contained no parasites. Triple centrifugation of the blood then also yielded trypanosomes. A thick blood film showed a *Plasmodium falciparum* infection.

In view of the trypanamide-resistant infections encountered locally, the child was treated with Arsobal (dose 3.6 mgm./kgm.). The first dose was given into the longitudinal sinus; the next 2 into the femoral [veins]; and the following injections into the heart, as suitable veins could no longer be found. Two series, each of 4 injections, were given with an 8-day interval. No immediate troubles resulted from the treatment. The child to date has thrived and remained physically well, though somewhat backward in walking and talking.

The child had not been out of the town of Léopoldville. Thorough examination of the parents revealed no evidence of trypanosomiasis. In 1953, however, the mother suddenly became acutely ill and died as a result of a condition registered as " ? encephalitis ".

The points of interest in this case were the lack of virulence of the infection and the absence of physical signs in spite of a heavy cerebrospinal fluid infection; the good physical condition of the child; the absence of cellular reaction in the ventricular fluid as opposed to the marked cellular reaction in the spinal fluid; the successful administration of Arsobal by exceptional channels; and the doubt as to the origin of the infection. If the infection had been intra-uterine the general condition of the child, it is thought, could not have so good at birth.

A. R. D. Adams

CHANDLER, R. L. **Experiments with the Trypanocidal Compound " 528 "** in West Africa. *Brit. J. Pharmacol. & Chemotherapy*. 1957, Mar., v. 12, No. 1, 44-6.

" Studies have been made on the use of the chloride salt of ' 528 ' against cattle trypanosomiasis in Nigeria. Toxic effects, terminating in death, were produced in cattle receiving the drug at 5 mg./kg. and above. The maximum permissible dose for field use in Nigeria was found to be 2 mg./kg. The drug had an appreciable curative action against a syringe-transmitted strain of *T. congolense*, but had no curative effect against two strains of *T. vivax*. It is concluded that ' 528 ' would be of very limited value in the treatment of cattle in West Africa, where *T. vivax* is the more important cause of cattle trypanosomiasis."

BIAGI F., F. Nueva infección natural con *Schizotrypanum cruzi*. Variabilidad cromática, y otras notas sobre triatomas mexicanas. [New Natural Infection with *Trypanosoma cruzi*. Colour Variation and Other Notes on Mexican Triatomata] Reprinted from *Prensa Méd. Mexicana*. 1956, v. 21, Nos. 7/10, 123-6, 2 figs. [17 refs.]

In Tenabo, Camp., 40 kilometres north-east of Campeche in Mexico, the author collected 4 specimens of *Triatoma dimidiata maculipennis*, one of which was heavily infected with trypanosomes morphologically resembling *T. cruzi*. The distribution of triatomid bugs naturally infected with *T. cruzi* in Mexico is discussed and shown on a map. The author has also found colour variations in *T. d. maculipennis* in different regions and examples are shown in illustrations.

New localities are cited for this species and for *T. phyllosoma pallidipennis*, *T. rubida sonoriensis* and *T. barberi*. Some specimens of the last-named bug were shown to be capable of flight and of being attracted by the light.

H. J. O'D. Burke-Gaffney

LARANJA, F. S., DIAS, E., NOBREGA, G. & MIRANDA, A. Chagas' Disease: a Clinical, Epidemiologic, and Pathologic Study. *Circulation*. New York. 1956, Dec., v. 14, No. 6, 1035-60, 16 figs. [29 refs.]

After discussing the aetiology and epidemiology of Chagas's disease the authors describe their findings in a series of acute and chronic cases, paying particular attention to cardiac involvement. They note the possible aetiological relationship between Chagas's disease and cardio-spasm (mega-oesophagus).

Acute infection usually occurs in the first years of life and such cases are more frequent in the summer months. Cardiac involvement, of greater or lesser intensity, probably occurs in almost every case of acute Chagas's disease. This is seen from a review of 19 acute cases in which the post-mortem examination leaves the impression that the heart lesions were essentially autopsy findings, the full clinical import of which could hardly be appreciated during life. In the authors' own series of 11 post mortems *T. cruzi* was demonstrated in the myocardial fibres. With the exception of the severity of the heart lesions, the manifestations of acute Chagas's heart disease do not differ essentially from those due to acute myocarditis of other aetiologies. In severe cases the picture is one of bilateral heart failure, bilateral increase of the cardiac shadow, regular heart rhythm, accelerated heart rate, gallop rhythm, or embryocardia [tic-tac rhythm], decreased systolic and low pulse pressure, with small radial pulse—all suggesting myocarditis. In mild cases detection of myocarditis is less accurate: gallop rhythm with diminution of the intensity of the first heart sound (delayed A-V conduction time) and signs of cardiac dilatation may be the only reliable clinical signs.

Enlargement of the cardiac shadow is present in most acute cases. Electrocardiographic abnormalities were present in 43·3% in 180 cases of acute Chagas's disease. The most common ECG changes were prolongation of the P-R interval, primary T-wave changes, low voltage of QRS and associated low ST-T changes (injury ischaemia pattern).

The authors compare findings in 159 non-fatal cases with those in 21 fatal cases, with the following results:

(1) Myocardial damage was detected by ECG in 86% of the fatal group; in the non-fatal only 37% showed electrocardiographic abnormalities.

(2) Prolongation of the P-R interval and primary T-wave changes were present in 20·1% of the non-fatal and in 33·3% of the fatal group.

(3) S-T displacement, associated with T-wave changes ('injury ischaemia') and low voltage QRS were uncommon in the non-fatal and had a significantly high incidence in the fatal group.

(4) The only two cases of intraventricular block (right bundle-branch block) were in the fatal group.

The appearance of right bundle-branch block in acute Chagas's heart disease indicates a grave prognosis.

As regards diagnosis, the parasites can be demonstrated in the peripheral blood during the first few weeks, but from the 6th to the 10th week this method of diagnosis becomes most difficult. At this stage recourse has to be made to xenodiagnosis or the precipitin test of MUNIZ and FREITAS. The complement-fixation test (Guerreiro-Machado reaction) may be negative in the early stages of the acute infection.

The mortality in the acute stage was 4-9% in 235 patients from Bambuí, Minas Gerais. Usually Chagas's disease has a protracted course, the acute stage passing into the chronic, and in most cases the manifestations of acute Chagas's heart disease disappear in a few months or years. There was no significant variation in the incidence between the sexes in 1,340 patients studied.

The clinical diagnosis of chronic *T. cruzi* infection in man rests on the recognition of chronic Chagas's heart disease. During the period 1943-55, 2,100 chronic and 280 acute cases of Chagas's disease were diagnosed in Bambuí, Minas Gerais. From 1,340 chronic cases in which electrocardiograms were recorded, 50·9% showed evidence of myocardial damage. Since 1945, up to the present, one-half of the patients with chronic *T. cruzi* infections showed evidence of heart damage. A survey of an unselected population 5-60 years of age in the same endemic area disclosed an incidence of 32·7% of chronic heart damage in the group with *T. cruzi* infection.

In the early manifestations of chronic Chagas's disease and myocardial damage the patient may have no symptoms and the cardiac shadow may be normal. In such patients, who are usually in the first or second decades, the diagnosis rests mainly on electrocardiographic abnormalities. Even severe heart disease, manifested by cardiac enlargement and

advanced degrees of A-V or intraventricular block or other abnormalities, may be symptomless.

Cardiac failure usually assumes the type of right and left ventricular failure with pronounced systemic congestion, and a right-sided failure with functional tricuspid regurgitation is frequently observed in those with advanced congestive failure. Reduplication of the second pulmonary sound is commonly heard. Gallop rhythm, a muffled first sound in the mitral area and systolic murmurs due to functional mitral or tricuspid regurgitation may be present in patients with congestive heart failure. In many of these patients there is increase of systemic venous pressure and pronounced hepatic enlargement. X-rays show moderate to diffuse enlargement of the cardiac shadow and evidence of passive congestion in the lungs. Often pulmonary congestion is not marked: a clear pulmonary field with marked bilateral enlargement of the heart shadow is a common finding.

In diagnosis the authors lay stress on the clinical history, and on the epidemiological factors in the area where the patient has lived and the type of house and the presence of bugs. A complement-fixation test is more valuable than xenodiagnosis. Complete right bundle-branch block and complete A-V block in patients under 50 from endemic areas are more commonly associated with chronic Chagas's heart disease. In the early stages, in patients under 20, chronic Chagas's heart disease may be difficult to differentiate from rheumatic carditis. Loud systolic murmurs due to functional mitral or tricuspid regurgitation in some cases may lead to erroneous diagnosis of valvular heart disease. Coronary heart disease is the most difficult problem in differential diagnosis, but chronic Chagas's disease occurs in lower age-groups and patients do not complain of the typical praecordial pain of coronary disease. At the present stage it is reasonable to assume that in countries where *T. cruzi* occurs such diagnoses as Fiedler's myocarditis or chronic myocarditis of unknown aetiology should be avoided, unless Chagas's disease has been excluded.

The heart lesions of chronic Chagas's disease develop and progress slowly. Even after the manifestation of heart failure the patient may survive for a long time. Some 55% of the fatal cases are in age-groups 21-40. Mortality is low in those under 20. The important point is made that sudden and unexpected death is common in this cardiopathy.

The pathological picture of chronic Chagas's heart disease with *T. cruzi* in the myocardium is still only incompletely known. The chief findings in the authors' series of 21 such cases are as follows:

Heart weight was increased. Left ventricular thickness exceeded 15 mm. in two patients. Circumscribed areas of endocardial fibrosis were present in the left ventricle in 15. Mural thrombi in different stages of organization at the apex of the left ventricle were found in 11 and a disseminated inflammatory process of the myocardium was found in all 21 patients. The cellular infiltration was focal and diffuse and consisted chiefly of lymphocytes, plasma cells and macrophages.

Leishmanial forms of *T. cruzi* in the myocardial fibres were found in all 21 cases. Occasionally the parasite may be seen phagocytosed by macrophages.

Aortic and coronary atherosclerosis was conspicuous in most of the patients over 40. In some there was severe reduction of the lumen of the coronary arteries. Myocardial ischaemia is probably an important mechanism in the development and progression of chronic Chagas's heart disease. Local endocardial thickening, disturbed myocardial nutrition through the Thebesian vessels, and blood stagnation in the veins of the heart probably play major roles in the production of the ischaemic myocardial lesions.

No drug has been found to be entirely effective. *Philip Manson-Bahr*

PACKCHANIAN, A. **Chemotherapy of Experimental Chagas' Disease with Nitrofurans Compounds.** *Antibiotics & Chemotherapy*. New York. 1957, Jan., v. 7, No. 1, 13-23. [18 refs.]

Drugs which have proved of some value in the treatment of Chagas's disease or in experimental infections of *Trypanosoma cruzi* have been described [this *Bulletin*, 1946, v. 43, 633; 1949, v. 46, 1131; 1952, v. 49, 938; 1953, v. 50, 20, 612]. Among these GOBLE found that certain 8-aminoquinolines or 6-methoxy-8-aminoquinolines were effective. In clinical trials Bayer 7602 Ac, which is diallyl malondi-(4-amino-2-methylquinolyl-6-amide), was probably the most successful.

The present author also found that certain nitrofuranes were of value. 47 other compounds of this series have now been tested by him, both *in vitro* and *in vivo*, against a virulent strain of *T. cruzi* designated WBHT, which also grew well in culture. The chemical formulae of the compounds tested are indicated in a table. Some were insoluble and used in suspension as described in an earlier report. *In vitro* these drugs appeared to be of little value. Suppressive effects were noted with 4 of the most active drugs *in vivo* but xenodiagnostic tests showed that cures had not been obtained. Four other compounds showed moderate activity while the remainder were only feebly active or completely inactive. The agreement between the *in vitro* and *in vivo* tests was not good. The author suggests that the 4 most active compounds might be given to patients alone or in combination with other agents as suppressants.

J. D. Fulton

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

TODOROVIĆ, K. Kala azar und Hautleishmaniosen in Jugoslawien. [**Kala Azar and Cutaneous Leishmaniasis in Yugoslavia**] *Zent. f. Bakt.* I. Abt. Orig. 1957, v. 167, No. 5, 390–95.

Over the last 25 years visceral leishmaniasis has appeared and spread in various regions of Yugoslavia. This process has been accelerated by both world wars during which infected persons from endemic areas were temporarily established in or passed through the country. Kala azar is now endemic in many areas and occasionally becomes epidemic; it has appeared in some areas up to 300–400 metres above sea level, well away from the usual endemic environment in towns along the coast or up the river flats.

The spread has occurred because of local existence of suitable vectors. 9 *Phlebotomus* spp. are possibly involved in the various areas, the most active being *P. major*, *P. chinensis* and *P. perniciosus*, especially in May, June and July.

Reservoirs of *Leishmania* are infected man and dogs (possibly occasional cats or wild animals) clinically sick or otherwise. The number of infected dogs is probably small but sufficient, since the parasite can be demonstrated in laboratory animals injected with dog blood. Dog infection is probably kept going by the zoophilic *P. perniciosus*.

The yearly figures for the incidence of kala azar bear a relation to those for sandfly fever. *P. papatasi* is not however regarded as a vector of *L. donovani*.

Kala azar appears mostly in the age-group 2–4 years, then in older children and young adults. Sucklings are hardly ever affected. The onset may occur in any season, even late winter or early spring.

The clinical picture in hot regions is classical, more moderate in continental areas.

Pentavalent antimonials are effective. Prophylaxis depends on eradication of sandflies.

Dermal leishmaniasis has been reported since 1934. Classical oriental sore has been described fairly frequently but probably only in visitors and not in the indigenous population. Skin leishmaniasis is not accompanied by generalized leishmaniasis, glandular or splenic enlargement. It is very persistent and difficult to treat. It is uncertain whether the dermal lesions arise from infection with a specific parasite or an adapted one.

The author concludes by pointing out that *P. major* is commonest in areas where kala azar is most frequent and *P. sergenti* in oriental sore areas; in the latter, *P. papatasi* plays an insignificant role.

B. G. Maegraith

SIMITCH T. & ZIVKOVITCH, V. La faune des phlébotomes de Yougoslavie et leur rôle dans l'épidémiologie de la fièvre à *papatasi*, du kala-azar et du bouton d'Orient. [*Phlebotomus Species in Yugoslavia and their Relation to Papatasi Fever, Kala Azar and Oriental Sore*] *Arch. Inst. Pasteur d'Algérie*. 1956, Sept., v. 34, No. 3, 380-87, 1 map. [19 refs.]

The authors discuss the history and incidence of papatasi fever, kala azar and oriental sore in Yugoslavia.

Papatasi fever is at present endemic in Yugoslavia except in Western Bosnia, Croatia and Slovenia. After World War II epidemics occurred in Serbia, southern Bosnia and in Vojvodine coinciding with increases in the numbers of *P. papatasi*.

Kala azar is also endemic today in Yugoslavia except in northern and western Bosnia, Croatia, Slovenia and Vojvodine. During and after World War II it spread into Serbia, Kosmet and southern Bosnia. In the older centres the incidence remains fairly constant but in regions of recent penetration (Serbia, Kosmet and southern Bosnia) the number of cases varies from year to year with the annual fluctuation in the numbers of *Phlebotomus*. The following species are given as probable vectors of kala azar: *P. major*, *P. perniciosus* var. *tobbi*, *P. chinensis* var. *simici* in Macedonia; *P. major*, *P. chinensis* var. *simici* and *P. perflucui* in Serbia and Kosmet; *P. major* and *P. perniciosus* var. *tobbi* in Herzegovina, Montenegro and southern and central Dalmatia; *P. major* and *P. perniciosus* in northern Dalmatia and Istria.

Oriental sore is endemic in central and southern Dalmatia and in Serbia, where the vector is *P. papatasi*.

From May to September each year from 1946 to 1949 more than 400 towns and villages were visited and *Phlebotomus* were collected by day and night from houses, stables, latrines and other places. Out of 27,058 specimens examined, 11,056 were taken in sleeping quarters. In addition to large numbers of the species named above there were smaller numbers of *P. minutus*, *P. sergenti* and *P. bruchoni*. Although *P. papatasi* was not the most numerous in the collection it was by far the most widespread species.

H. S. Leeson

ANANTARAM, M. & RAMACHANDRAN, M. S. A Case of Dermal Leishmanoid in Madras. *J. Indian Med. Ass.* 1957, Jan. 16, v. 28, No. 2, 114.

"A case of dermal leishmanoid in Madras is reported. Nodules were present in the ears. There was hypopigmentation in certain areas of the face. The condition resembled that of lepromatous leprosy. A previous history of kala-azar was given. Skin clippings from nodules in ears were positive for L.D. bodies. Condition improved after treatment."

[For 2 previous cases see this *Bulletin*, 1931, v. 28, 161, 648.]

GREMLIZA, F. G. L. Epidemische Hautleishmaniosen im Kindesalter. [Epidemic Cutaneous Leishmaniasis in Children] *Ztschr. f. Tropen-med. u. Parasit.* Stuttgart. 1956, Nov.-Dec., v. 7, No. 4, 385-97, 9 figs. [21 refs.]

Soussanguerd lies on the Karcheh river, 70 km. north-west of Ahwaz, the capital of Khuzistan. The soil is salty and bears a scanty vegetation. The summer is long and dry and is succeeded by a mild winter with a little moisture. The climate therefore approximates a tropical character. The inhabitants are mainly Arabs.

Cutaneous leishmaniasis occurs throughout the year. During the periodical interepidemic phases, which characterize this disease, the town remains the endemic focus from which the infection spreads. Epidemiological considerations are as follows: the parasite is *Leishmania tropica*: the vectors *Phlebotomus papatasi* and *P. sergenti* which are numerous and widely distributed in this area. The following social circumstances must be taken into consideration: there is malnutrition with avitaminosis; the clothing is scanty; there is overcrowding in mud huts, and unsatisfactory washing facilities, lack of hygiene and most primitive surroundings facilitate infection. There are constant adverse climatic conditions. All the factors present create favourable conditions for the spread of epidemic cutaneous leishmaniasis.

Formerly the huts were constructed of reeds, but these are now reinforced with mud which produces a dark, damp, stuffy atmosphere which is ideal for the propagation of sandflies.

The role of dogs in the genesis of epidemics of leishmaniasis is suggested by the observation that during the cool season (December-February) they are preyed upon regularly by *P. sergenti*. Moreover, these insects congregate in rat holes in houses and yards throughout the year.

The author has devised a special technique for obtaining tissue from the sores for diagnosis. A drop of saline is placed in the centre of a circular coverslip. Then a fine dental needle with corkscrew tip (used by dentists for nerve extirpation) is inserted with rotating action into the margin of the sore or ulcer which has previously been cleansed with xylol. The depth of insertion should be 5 to 10 mm. and the needle should be left *in situ* for 30 seconds. A twist is then given and then it is rapidly withdrawn. This painless operation should be performed in three places and the adhering tissue rubbed into the hanging drop of saline in the slip. The preparation is then dried under a watchglass.

The author favours Giemsa-May-Gruenwald stain modified by Lestoquard to demonstrate the parasite, which he claims often assumes a leptomonad shape.

From the clinical angle the most important fact is the frequency of sores on the nose, usually solitary but occasionally multiple.

In the course of the disease 4 stages can be recognized:—

I. Papular and nodular bluish-red nodules with some surrounding infiltration.

II. Circumferential expansion with blister formation.

III. Ulceration with crust formation. When the upper layer is removed a nail-shaped light grey appearance is revealed, which has been termed by Behcet *signe de clou*. It is really an interpapillary epithelial structure.

IV. The moist stage, which is produced by formation of small granulomata of which the centre is bathed with secretion and a greasy greyish-yellow membrane.

In treatment the drugs most favoured were Neostibosan and Solustibosan, mostly by the intramuscular route. The local infiltration of the sores can be effected with Solustibosan as it does not cause pain. This is important as the majority of the sores are situated near the nose and eyes of children with this disease. For parenteral therapy, which is generally necessary, Neostibosan is preferred. *Philip Manson-Bahr*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

ZDRODOVSKIJ, P. F. & GOLINEVICH, E. M. [**Rickettsiae and Rickettsioses**]
2nd Edition, revised and enlarged. 492 pp., numerous illustrations.
[In Russian.] 1956. Moscow: Medgiz.

According to the preface it has been necessary to prepare a second edition of this work to satisfy popular demand in Russia after the exhaustion of the first edition, and opportunity has been taken to make alterations necessitated by recent advances in the knowledge of rickettsioses. The chapter on Q fever has been rewritten in order to include accounts of the recent discovery of this disease in many parts of the Soviet Union, and new matter has been added on the topics of rickettsial immunity, recurrent typhus, the problem of latency, and recent American work on the use of a live vaccine prepared from the avirulent Spanish strain.

The book is divided into general and special sections, which contain 158 and 276 pages respectively. The general part contains chapters on the classification of rickettsiae, their morphology (although work on electron microscopy is unfortunately too recent to be included), rickettsiosis as a disease of arthropods, and laboratory aspects, including an account of techniques of cultivation and serological methods. An interesting feature of the general section is a series of detailed and illustrated accounts of the anatomy of the arthropod vectors.

In the special section the diseases caused by rickettsiae are dealt with in turn; a chapter is devoted to each one, with an account of the clinical

features, diagnosis, epidemiology, ecology and prophylaxis. A chapter on chemotherapy includes a brief account of the results obtained with Russian antibiotics in experimentally infected mice; Biomyacin was as effective as aureomycin, and Levomycin and Synthomycin had about one-tenth of the activity.

The book is a valuable monograph in which equal weight is given to all parts of the subject, and the usual preponderance of clinical aspects and laboratory methods has been avoided. For a Russian publication the standard of production is quite high, although not equal to European and American standards, and the reproduction of the photomicrographs is far from satisfactory.

D. J. Bauer

SÉRIÉ, C., OVAZZA, M. & GUTFREUND, R. Microélectrophorèse de l'hémolymphe du pou (*Pediculus humanus*). [**Micro-Electrophoresis of the Haemolymph of *Pediculus humanus***] *Bull. Soc. Path. Exot.* 1956, Sept.-Oct., v. 49, No. 5, 831-7, 8 figs.

Paper micro-electrophoresis applied to the haemolymph protein content of clean laboratory-reared lice showed one fraction in males, and an additional two in females; these bands were constant under laboratory conditions, and did not vary significantly with age or degree of starvation. The volume of haemolymph did not differ in starved compared with recently fed lice, but was about twice as great in females as in males.

Female lice infected with *Rickettsia prowazeki* (3 strains used) were tested at intervals of 4, 5, 6 and 8 days after infection, and two types of result were obtained. In low grade infections (40 to 60% strongly positive), the male protein fraction was markedly increased, and the other two fractions diminished. In heavy infections (95 to 99% strongly positive), all three protein fractions were diminished.

Full details of techniques used are included.

N. R. Phillips

SUTORISOVÁ-STOLZOVÁ, Margita & GEORCH, D., with the technical assistance of V. KAUFEROVÁ, M. PUTZOVÁ & I. ROZBORILOVÁ. Zotrvanie protilátok po prekonaní škrvnivky. [**Persistence of Antibodies after Typhus Fever**] *Českoslov. Epidemiol., Mikrobiol., Imunol.* Prague. 1957, v. 6, No. 1, 43-7, 2 graphs. English summary.

The course of antibody titre during convalescence from typhus fever was studied in 20 patients by means of the Weil-Felix reaction and microagglutination and complement-fixation reactions with *Rickettsia prowazeki* antigens. The titres obtained by the 3 methods during observation periods of 72-536 days are shown in a table. The titre in the Weil-Felix reaction had usually fallen to zero after 6 months and complement-fixing antibody also declined steadily, although titres of 20-40 were still observed after 18 months. The microagglutination titre

declined very slowly, however, and titres of 160–320 were observed at the end of the period of observation, and in 6 other instances similar titres were observed as long as 4–8 years after the illness. *D. J. Bauer*

LAWLEY, B. J. **The Discovery, Investigation and Control of Scrub Typhus in Singapore.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Jan., v. 51, No. 1, 56–61, 1 map.

A case of scrub typhus at Changi led to the discovery of 8 precedent and 8 subsequent cases among service men and their families. Rats were caught in 5 areas of waste land and those in one area were found to harbour mites. All the 148 rats subsequently caught in this area were found infested and *Rickettsia orientalis* was isolated from one batch of mites. Control measures included routine methods of isolation followed by the application of dieldrin at a rate of 2.2 lb. per acre in the form of an emulsion spray to the infested area of ground. Three rats found on the second and third days after the spraying were infested, but 7 caught between the fourth and tenth days were free, and none of the 2 or 3 caught in each of the next 10 months were found infested. No toxic effects of dieldrin were experienced by persons handling it.

G. Macdonald

HOOGERHEIDE, C. & ENSINK, G. J. **Two Small Explosions of Scrubtyphus in Netherlands New-Guinea.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Mar., v. 9, No. 1, 94–6.

“The authors describe two groups of patients, comprising 15 Netherlands marines, who contracted scrubtyphus in Netherlands New-Guinea. In all the Weil-Felix test (OXK) was positive, the titre varying from 1/100 to 1/3,200. *Rickettsia orientalis* was cultivated from the blood of one of the patients.

“Nearly all were treated with chloromycetin, but many patients had one or two relapses which were again treated with the same antibiotic. All patients recovered.”

YAMAGUCHI, T., HORIE, N., MIKI, T. & ONO, Y. [Studies on Tsutsugamushi (Trombiculid Mites) in Shikoku. Part 3. An Epidemiological Survey of “Shikoku Type” Tsutsugamushi Disease] *Shikoku Acta Med.* 1956, Nov., v. 9, No. 5, 64–77, 9 figs. [14 refs.] [In Japanese.] English summary.

This is a description of further surveys of the trombiculid mites of the two small Japanese islands, Shikoku and Awaji, where a disease now known to be a type of tsutsugamushi fever had been prevalent between 1918 and 1948 as a severe illness with a fatality rate of more than 50%.

During this period the aetiology of the disease was unknown, the only recognized focus of tsutsugamushi disease in Japan being in the north-west of Honshu Island. It was not till 1948 that this disease was detected among American troops billeted on the slopes of Mount Fujiyama, and since that time the diseases in Shikoku, Awaji and various other places in Japan were recognized as tsutsugamushi fever or nearly related forms of mite-borne rickettsial fevers.

It is interesting to note that the authors in the title of the paper employ the word "tsutsugamushi" as meaning "trombiculid mite"; it had long been used in Japan to mean "disease mite" or "disease bug," so that the old name "tsutsugamushi disease" refers to the arthropod vector and is therefore a more suitable name than scrub typhus, besides having long standing priority.

In the present survey the authors have collected 37,831 specimens of trombiculid mites belonging to 19 species from 1,297 hosts in the two islands during the years 1953-1956. They have brought the number of species found in the area to 28 which are listed in the paper.

"After extensive and repeated surveys" the authors have concluded that *Trombicula tosa* is the most probable vector of the disease in the area. It has been found only in the affected areas and always in them; it has the same seasonal occurrence as the disease and is specially associated with *Rattus norvegicus*, which in turn is closely associated with man. The authors' actual words are that "*T. tosa* is a most doubtful vector of the disease," but they have obviously been misled by a misunderstanding of the English idiom; all their arguments favour the suspicion rather than the doubts of its being a vector.

John W. D. Megaw

SASA, M. & MIURA, A. **Studies on Tsutsugamushi, Part 89. Description of the Nymphs of *Trombicula kuroshio*.** *Japanese J. Exper. Med.* 1956, Apr., v. 26, Nos. 1/2, 25-8, 2 figs.

CAUVIN, TASQUE, P. & LANGUILLON. Endocardite infectieuse subaiguë primitive et rickettsioses, guérison rapide par la rovamycine. [**Primary Subacute Infective Endocarditis and Rickettsial Infections cured rapidly by Rovamycine**] *Bull. Soc. Path. Exot.* 1956, Sept.-Oct., v. 49, No. 5, 786-9.

The authors recall that DONZELOT *et al.* [this *Bulletin*, 1950, v. 47, 971], after analysing 200 cases of subacute infective endocarditis, considered that 24 were caused by the persistence of a previous rickettsial infection or were sequelae of rickettsial endocarditis, evidence for which came from the histories and serology in the 22 cases where blood cultures were negative. 16 of the first 18 patients died. Later reports indicated that although penicillin is usually ineffective, cases have been cured by

chlortetracycline, Tifomycine (chloramphenicol) and Rovamycine (spiramycin). The authors report a case where the clinical history of fever, cardiac signs and splenomegaly suggested a diagnosis of infective endocarditis with no preceding rheumatic or cardiac lesions. There was a considerable neutrophil leucocytosis (79% of 15,400 leucocytes per cmm.). There was no albumin in the urine or red cells in the deposit. 5 blood cultures were negative. There was no response to penicillin 1 mega unit and streptomycin 1 gm., both twice daily. Three days later the treatment was changed to Rovamycine 2.5 gm. daily and within 48 hours there was a great improvement and the patient became completely and permanently afebrile by the fifth day. The signs of cardiac involvement disappeared. Subsequent investigations showed that the patient's serum agglutinated the antigen of boutonneuse fever but not the antigen of epidemic typhus, murine typhus, Q fever and other rickettsiae. A second test showed the presence of neutralizing antibodies to the antigens of epidemic typhus as the authors state to be the case in the boutonneuse fever group.

The authors conclude that although the mode of production of infective endocarditis remains indefinite this case was due to persistent rickettsiae of boutonneuse fever and illustrates the value of instituting treatment with Rovamycine.

Frederick J. Wright

STOKER, M. G. P. **Q Fever down the Drain.** *Brit. Med. J.* 1957, Feb. 23, 425-7, 1 diagram.

The title of this paper refers to an unusual route by which 2 unvaccinated laboratory workers became infected with Q fever. In the laboratory concerned, work with living strains of *Rickettsia burneti* was restricted to rooms on the 3rd floor and roof. The patients were men who worked on the first floor and apparently contracted the infection in a media room on this floor when it was flooded with sludge from a blocked drain carrying waste water from sinks in the Q fever laboratory overhead. It seemed probable that they had been infected by inhaling droplets containing *R. burneti* from the sludge, and this was supported by isolation of the organism from material collected from the drain pipe. The most likely source of living rickettsiae was infected yolk adhering to tissue grinders and blenders, which were normally treated with 5% lysol overnight before being washed in the sink.

Three other cases of Q fever had occurred among laboratory staff during the previous 9 months. One patient had been exposed to infected yolk sacs shortly after vaccination, probably before the protective effect of the vaccine had fully developed. The remaining 2 infections occurred in unvaccinated workers on the first floor; one had entered the Q fever laboratory for a few seconds, while the other had been in contact with an assistant from the Q fever laboratory. No infections other than those

now recorded were detected from October 1949 to March 1955, this being the period during which living strains of *R. burneti* were used in the laboratory.

R. S. F. Hennessey

RAŠKA, K. & SYRŮČEK, L. Ein Beitrag zur Epidemiologie der Q-Rickettsiose. [**A Contribution to the Epidemiology of Q Fever**] *Zent. f. Bakt.* I. Abt. Orig. 1956, v. 167, No. 4, 267-80. [13 refs.].

This paper is a valuable contribution to knowledge of the epidemiology of Q fever. The authors and 8 expert collaborators have made a survey of the incidence of the antibodies and rickettsiae of the disease among domestic and free-living mammals and birds in localities in which infection had been found to occur among the inhabitants. The survey was carried out in Czechoslovakia during the years 1952-1956. The localities are designated by numbers 1-7, their geographical situation is not specified in detail, but they are said to have been large State farms or isolated villages.

The findings are shown in 13 tables, only 4 of which refer to particular localities; in the others the animals tested are merely stated to have come from places in which Q fever was prevalent.

The tests employed were the complement-fixation reaction, regarded as positive at titres over 1 in 8, and the isolation of *Coxiella burnetii* [*Rickettsia burneti*] by inoculation of the animal's tissues into guineapigs. For the latter test animals were selected which had given positive reactions with the fixation test. The first table shows the overall results of the fixation test of farmyard mammals and birds; positive reactors are shown as P, negative reactors as N, and when the numbers tested were sufficient the percentages of positives are shown in brackets; it should be noted that these are the percentages of all the sera tested including those found unsuitable:—Cows, P, 543; N, 908 (37.4%). Sheep, P, 135; N, 115 (54.0%). Goats, P, 53; N, 40 (57.0%). Horses, P, 15; N, 6. Dogs, P, 9; N, 4. Hens, P, 51; N, 291 (14.9%). Geese, P, 7; N, 52. Ducks, P, 8; N, 150. Pigeons, P, 8; N, 26. Turkeys, P, 2; N, 35. Among 10 pigs, 4 cats and 6 rabbits no positive reactor was found.

The tests were extended to the free-living birds of the same localities. Among the birds most closely associated with human settlements, and therefore classed as "eusynanthropic", the following results were obtained:—Swallows, P, 8; N, 82. House-martins, P, 13; N, 46. House-sparrows, P, 6; N, 49. The average percentage of positives for these birds was 13.2. Among birds associated less closely with human settlements and classed as "synanthropic", including tom-tits, yellow-hammers, wrens and chaffinches, 6.1% of 225 examined gave positive reactions. Among birds having no association with man and classed as "exoanthropic" only 2.1% of positives occurred. The 3 positive reactors in this class were a woodpecker, a jay and a greenfinch.

In attempts to isolate rickettsiae from the organs of more than 40 free-living birds of various kinds the only definite successes were the recovery of 2 strains from 3 wagtails and 1 strain from the only redstart examined. Doubtful results were obtained from 2 out of 7 swallows and one each from 5 pigeons, 3 wagtails and 5 jays.

Complement-fixation tests were carried out on a large number of rodents, most of which were captured in one heavily affected locality. The chief findings were:—Mice (*Mus musculus*), P, 13; N, 127. Rats (*Rattus norvegicus*), P, 9; N, 54. *Apodemus flavicollis* and *A. sylvaticus*, P, 9; N, 196.

No positive reactions occurred among 126 shrew-mice of 4 different species captured in one locality.

In attempts to isolate the rickettsiae from various rodents the following results were obtained:—with *Rattus norvegicus*, 1 positive and 19 negative, with 30 *Mus musculus*, 2 positive, 25 negative, and 3 doubtful. With 28 rodents of 5 other species there was 1 positive result.

In their discussion the authors refer not only to their own study but also to existing knowledge of the epidemiology of Q fever as a world disease. They found it surprising that in their own research and in the reports of most of the other workers there is so little evidence of ticks having played a part in the transmission of infection among lower animals or from animals to man.

In the localities surveyed by the authors the disease appears to have been introduced since World War II by the importation from foreign countries of infected sheep from which the disease spread rapidly to the cattle, sheep and goats of the area and from these to the human population, to the other domestic mammals and to the birds of the farmyards and eventually to the free-living mammals and birds of the area. There was no evidence of the previous existence of the disease in the places investigated and in one of them a survey had been made in 1953 of the workers in the local abattoir and dairy farms without finding a single positive response to the serum tests; yet in the following 2 years several of these workers had confirmed attacks of Q fever. The rapid spread of infection strongly suggested an extension over "virgin soil".

Poultry, especially hens, are regarded as deserving further study in view of the possibility of their being reservoirs of infection. The same remark applied to rats. Migrating wild birds such as swallows which are closely associated with farmyards may possibly be of importance in conveying infection to distant countries.

Detailed recommendations are given for the control of the disease which obviously has assumed considerable importance since the establishment of large State farms with their great concentrations of cattle and sheep.

Continued study of the disease in the localities in which it has appeared for the first time is likely to yield valuable information.

John W. D. Megaw

BREZINA, R. & TÁBORSKÁ, D. Antigénne vlastnosti kmeňov *C. burneti* izolovaných na Slovensku. [**Antigenic Relationships of Strains of *C. burneti* isolated in Slovakia**] Českoslov. Epidemiol., Mikrobiol., Imunol. Prague. 1957, v. 6, No. 1, 34-42. [17 refs.] German summary.

The L32, L35 and Geschwantner strains of *Rickettsia burneti* isolated from an outbreak of Q fever in Slovakia in 1954 have been compared with the reference strains Henzerling, Constantza and Nile Mile in cross-fixation and cross-absorption tests with ether-extracted yolk-sac antigens and human, guineapig, mouse, cotton rat and ferret immune sera. The titres obtained are presented in tables, and the results show that the Slovak strains differ antigenically from the reference strains and also from each other. The reference strains were closely related, although not identical, and lower titres were obtained with Constantza antigen.

D. J. Bauer

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

GALINDO, P., DE RODANICHE, ENID & TRAPIDO, H. **Experimental Transmission of Yellow Fever by Central American Species of *Haemagogus* and *Sabethes chloropterus***. Amer. J. Trop. Med. & Hyg. 1956, Nov., v. 5, No. 6, 1022-31. [13 refs.]

Recent investigations, following the appearance of sylvan yellow fever in Central America in 1948 at Panama, have shown that the known South American vectors of sylvan yellow fever whose range extends into Central America (*Haemagogus spegazzinii falco* and *Aedes leucoclaenus*) are uncommon or absent in places where yellow fever has occurred [this *Bulletin*, 1956, v. 53, 44]. Consequently the authors have attempted to find the most probable vectors in these areas. Mosquitoes were allowed to feed on monkeys 2-5 days after subcutaneous injection with yellow fever virus. It was possible to feed *Haemagogus* on restricted shaved areas of the monkeys, but *Sabethes chloropterus* was found to feed only in a large cage, where they fed mainly about the face and hands of the monkey. *Haemagogus mesodentatus gorgasi*, *H. m. mesodentatus*, *H. equinus* and *Sabethes chloropterus* were fed on infected monkeys and after an incubation period of 26-34 days each species was allowed to bite an uninfected monkey. Rhesus monkeys bitten by the three forms of *Haemagogus* all developed fever after 3-5 days and died

after 6-7 days. A monkey exposed to biting by *Sabethes* for 5 days developed fever after 15 days and died after 17 days. By injection into mice the presence of yellow fever virus was demonstrated in the three forms of *Haemagogus* but not in *Sabethes*.

A second experiment again showed transmission by bite in *Haemagogus equinus* and *H. mesodentatus gorgasi*, but not in *Sabethes chloropterus* or *Haemagogus lucifer*. However, *H. lucifer* was shown to be infected with yellow fever virus. Yellow fever virus was not demonstrated in *Sabethes* in this second experiment.

A third transmission experiment with *H. mesodentatus gorgasi*, *H. equinus* and *H. lucifer* was not successful but the presence of yellow fever virus was demonstrated in the first two species though not in *H. lucifer*.

B. R. Laurence

RABIES

MONTHLY BULL. MINISTRY OF HEALTH & PUB. HEALTH LAB. SERVICE
(DIRECTED BY MED. RES. COUNCIL). 1957, Mar., v. 16, 34-7. **Indications for Anti-Rabies Treatment.**

"The less leisurely and more frequent travel of modern times have resulted in enquiries for advice on the need for anti-rabies treatment from those who may have been in contact with rabid animals abroad."

Readers of this *Bulletin* will be familiar with the material of this memorandum from the Ministry of Health, but in view of the observation quoted above, it is a timely and useful guide for practitioners in Britain who will be unfamiliar with rabies.

The chances of rabies being acquired in Britain are most unlikely, except in institutions where the virus is handled or in kennels where there are recently imported dogs: but the possibility of evasion of quarantine regulations must be kept in mind. Most enquiries in Britain will therefore be from persons newly arrived from areas where rabies is endemic, who have been notified that a dog with which they may have been in contact has been suspected of being rabid.

The incubation period is discussed and emphasis is laid on the need to establish that there has been a definite risk of infection. The common sources of infection are listed and the need for confirmation of the diagnosis in the attacking animal is stressed. The points to be considered before advising treatment are set out. The development of artificial immunity is discussed and the treatment recommended is 14 to 21 daily injections of vaccine together with injections of antiserum in the first two days [this *Bulletin*, 1956, v. 53, 434, 435].

The hyperimmune serum and antirabies vaccine, together with advice regarding treatment, may be obtained in Britain through the Public Health Laboratory Service at Colindale (London), Newcastle, Cardiff and Liverpool.

The complications of vaccine prophylaxis are outlined and the effectiveness of the vaccine is discussed in the light of various records in the literature. Nursing precautions are mentioned.

An appendix sets out the indications for post-exposure treatment recommended by the WHO Expert Committee on Rabies [*ibid.*, 1955, v. 52, 149].

H. J. O'D. Burke-Gaffney

BELL, J. F., HADLOW, W. J. & JELLISON, W. L. **A Survey of Chiropteran Rabies in Western Montana.** *Pub. Health Rep.* Wash. 1957, Jan., v. 72, No. 1, 16-18.

"Three of the 127 bats, comprising 7 species, collected in western Montana for the Rocky Mountain Laboratory of the Public Health Service, were found to be infected with rabies virus. The infected bats were *Myotis californicus californicus*, *Eptesicus fuscus pallidus*, and *Lasiurus cinereus cinereus*.

"It is noteworthy that none of 121 bats collected while roosting were infected whereas 3 of 6 bats that exhibited abnormal behavior had rabies. The titers of virus in the brains of mice infected with the 3 strains were rather low and remained low even after several passages. Stamm and his associates found the same to be true of one Florida bat strain. The three isolations from bats were the only isolations of rabies virus in Montana in 1955."

[See this *Bulletin*, 1956, v. 53, 581.]

SCHINDLER, R. Der Einfluss der Hyaluronidase auf die Infektion der Maus mit Tollwutvirus. [**The Effect of Hyaluronidase on Infection of the Mouse with Rabies Virus**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1956, Nov.-Dec., v. 7, No. 4, 472-83. [Numerous refs.]

The English summary appended to the paper is as follows:—

"The influence of hyaluronidase on the course of experimental rabies infection in mice has been investigated. Subcutaneous and intramuscular inoculation of virus is followed by increased mortality and Negri body formation, if hyaluronidase has been added to the inoculum. Intracerebral inoculation, however, did not react to the enzyme added while intravenous inoculation failed to produce infection at all, regardless whether hyaluronidase had been added to the inoculum or not. Accordingly, the influence of hyaluronidase on the course of rabies infection appears to be peripheral in origin and does not affect the brain directly."

[See this *Bulletin*, 1957, v. 54, 420.]

BRYGOO, E. R. & DODIN, A. Action de la cortisone sur l'évolution de la rage chez la souris. [**The Action of Cortisone on the Development of Rabies in Mice**] *Ann. Inst. Pasteur.* 1957, Feb., v. 92, No. 2, 282-5.

The following is a translation of the authors' summary:—

1. 10 daily doses of 1.25 mgm. of cortisone administered intraperitoneally have no appreciable effect on either the appearance of paralysis or on the survival time of mice inoculated by the intracerebral route with rabies virus.

2. In mice inoculated by the intraperitoneal route with street virus the administration of cortisone appears to have no effect on the appearance of paralysis but does appear to shorten the course of the disease.

3. The administration of cortisone modifies the appearance of histological lesions in mice inoculated with rabies virus. *John Rathborn*

DODIN, A. & BRYGOO, E. R. Action de la cortisone associée au sérum hyperimmun sur l'évolution de la rage des rues chez la souris. [**Effect of Cortisone in Association with Hyperimmune Serum on the Development of Street Rabies in Mice**] *Ann. Inst. Pasteur.* 1957, Feb., v. 92, No. 2, 286-7.

The following is a translation of the authors' summary:—

Cortisone has an unfavourable effect on mice treated for street rabies with hyperimmune serum. *John Rathborn*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

CROCKER, T. T., CHEN, T. H. & MEYER, K. F. **Electron Microscopic Study of the Extracellular Materials of *Pasteurella pestis*.** *J. Bacteriology.* 1956, Dec., v. 72, No. 6, 851-7, 6 figs. [11 refs.]

An extracellular substance was visible in electron micrographs of *Pasteurella pestis* grown on collodion films over agar. This substance was more abundant in colonies of virulent than of avirulent strains, and could be removed by washing with distilled water. It is thought to represent the soluble envelope or slime layer which is probably the source of the non-somatic antigens of *P. pestis*. *R. S. F. Hennessey*

GRENIER, P. & RAGEAU, J. Rongeurs et puces en Nouvelle-Calédonie. [**Rodents and Fleas in New Caledonia**] *Bull. Soc. Path. Exot.* 1956, Sept.-Oct., v. 49, No. 5, 827-31. [10 refs.]

An investigation into enzoötic plague as a basis for the recurrent epidemics of the disease in New Caledonia over the past 50 years revealed only two species of likely reservoir hosts. These were *Rattus rattus* (subsp. *rattus* and *alexandrinus*) and *R. norvegicus*; no indigenous rodents occur in the island. The probable vector was *Xenopsylla cheopis*, the only other flea present being *Ctenocephalides felis*. The possibility of repeated reintroduction of *Pasteurella pestis* from the outside world is discussed.

N. R. Phillips

KARTMAN, L. & PRINCE, F. M. **Studies on *Pasteurella pestis* in Fleas. V. The Experimental Plague-Vector Efficiency of Wild Rodent Fleas compared with *Xenopsylla cheopis*, together with Observations on the Influence of Temperature.** *Amer. J. Trop. Med. & Hyg.* 1956, Nov., v. 5, No. 6, 1058-70. [32 refs.]

Attempts were made to determine the experimental plague vector efficiencies of 13 species of fleas (of which 12 were from wild rodents), and the results compared with *Xenopsylla cheopis*; there was a partial overlap of data given by BURROUGHS [see this *Bulletin*, 1948, v. 45, 254]. Methods employed in the present studies were essentially similar to those used in the third paper in this series [*ibid.*, 1957, v. 54, 32] where certain modifications were introduced. Fleas were generally maintained at laboratory temperature; humidity was augmented, but not controlled.

In this paper, a vector efficiency of 0.04 at 21°C. was obtained for *Diamanus montanus*; this figure agrees well with values obtained at comparable temperatures by some other workers (0.02 to 0.04). There is, however, a tendency for *D. montanus* to approximate to either a lower (as here) or a statistically distinct higher value (0.84 to 1.04) of vector efficiency; the latter results from consistently higher values for all three of the potentials involved, rather than for any one of them. Dual grouping is supported by the calculation of blocking-survival potentials and vector indices, and is considered to be due to different geographical strains of *D. montanus*. Zero vector efficiency was obtained for *D. montanus* at 8°C.; this was the result of a failure to block, since infection potential equalled that of fleas in the 0.02 to 0.04 group for vector efficiency.

Additional values obtained for the vector efficiency of *X. cheopis* were 0.81 at 8°C., 1.15 at 20°C., 0.48 at 21°C. (other published data at 21°C. include 0.39, 0.43, 0.66) and 0.12 at 30°C. The greater experimental efficiency of *X. cheopis* at 20-24°C. than at 29-32°C. is well known, and has been correlated with plague epidemics. Determinations of blockage-survival potentials and vector indices at the various temperatures showed

that these were greater at 20–22°C. than at lower or higher temperatures; at 30°C. low blocking-survival potential was responsible for poor transmission potential. The extrinsic incubation period in *X. cheopis* was markedly affected by temperature; mean values were 34.4 days at 8°C., 18.6 days at 20–22°C. (including data of other workers) and 11.9 days at 30°C.

Experimental determinations of vector efficiency for wild rodent fleas gave the following results: *Epitedia wenmanni wenmanni* \times *testor* 0.04, *Megabothris abantis* 0.08, *Monopsyllus exilis kansensis* 0.11, *M. wagneri wagneri* 0.01, *Thrassis fatus* 0.09, *T. bacchi johnsoni* 0.17, *Hystri-chopsylla* sp. 0.20. Zero values were obtained for *Megabothris clantoni johnsoni*, *Leptopsylla segnis*, *Atyphloceras multidentatus*, *Meringis shannoni* and *Catallagia decipiens*. Temperatures varied at 17°C., 20°C. and 21°C. Blocking-survival potentials and vector indices are given for all of the species named. Several of the results were based upon small and possibly non-significant numbers.

Part III of this series is mentioned above: for parts I and II, see this *Bulletin*, 1955, v. 52, 360, 534, and for part IV, *ibid.*, 1957, v. 54, 284.

N. R. Phillips

NETSENGEVICH, M. R. [Toxic Effect of DDT on Rat Fleas *Xenopsylla cheopis* (Laboratory Data)] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 1, 34–9, 1 fig. [In Russian.]

The English summary appended to the paper is as follows:—

“There was confirmed a high sensibility of fleas to the action of DDT. Trials of a number of doses of DDT showed that at room temperatures a contact with a poisoned surface for one hour or longer caused death of the *X. cheopis* in the course of 24 hours and with any amount of DDT tested (from parts of a gram to 2 grams of pure substance per sq. metre).

“A transitory contact (from 15 seconds to 5 minutes) did not have fatal effect on all the fleas when usual doses of poison were used (1–2 gm. per sq. metre).

“The study of the effect of low temperatures (4–6°C) on the efficacy of DDT on fleas of the same species did not reveal any practically substantial difference when compared with the results of tests at room temperature. This allowed to draw a conclusion that necessary work may be carried out in cellars, refrigerators, and in winter time, without changing the dosage of the poisonous substance.

“At high temperatures (30–32°C) at the optimal humidity, and after an adequately long contact, DDT killed the fleas in a shorter period of time than at lower temperatures.

“For practical application of DDT it is recommended to make a confluent cover of the treated object. An irregular covering might prove to be ineffective even when great quantities of the insecticide are used.”

FEDOROV, M. N. [**Laboratory Tests of Simultaneous Extermination of Rodents and their Ectoparasites**] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 1, 40-42. [In Russian.]

The English summary appended to the paper is as follows:—

“In principle, it is possible to exterminate rodents and their ectoparasites by using complex food-baits containing both raticides and insecticides. Simultaneous extermination of rodents and their ectoparasites may become particularly important if deratisation is prompted by epidemiological evidence.

“When DDT was administered to white mice intragastrically, its toxic effect was observed on both the mice and the fleas which fed on their blood. Dosages higher than 3 mg of DDT per animal, caused death of both the mice and the fleas.

“DDT remained in the blood of white mice for over 10 days. During this period a high death-rate of the fleas feeding on the animals was observed.

“Adding DDT to food-baits poisoned with Krisid ($C_{11}H_{10}N_2S$) and the zinc phosphide in proportion of 1:1, 1:2 killed both the mice and the fleas.

“Poisoning white mice with baits containing Kastrix and DDT resulted in death that followed already in 40-90 minutes, in view of which fact the death-rate of the fleas was only 13.3 per cent.

“Complex baits containing Krisid and DDT killed both field mice and the ticks *Laelaps pavlovskii* Zem. feeding on them.”

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

FELSENFELD, O. & ROKKAKU, W. K. **Adaptation of the Membrane Filter Technique to the Recovery of *Vibrio comma* from Water Samples.** *J. Bacteriology.* 1956, Dec., v. 72, No. 6, 869-70.

The recovery of *Vibrio cholerae* from artificially infected water is described; membrane filters were incubated on modified Aronson medium containing beef extract 0.3%; pancreatic digest of casein (Difco) 1.5%; agar 1%; sucrose and dextrin 1% each; sodium carbonate 0.5%; basic fuchsin 0.012%; sodium sulphite 0.2%. Examination was made with a lower power microscope after 6 hours' incubation and by naked eye after 24 hours. The method was compared with growth on peptone broth at pH 8.4 for 8 hours followed by plating on Aronson medium as above, but containing 3% agar, and incubation for 24 hours. The membrane filter technique proved superior especially in samples

containing very few organisms. In the presence of very numerous organisms, however, confluent growth occurred. Results were available with the membranes in 6 hours, and after 24 hours colonies were large enough to be used for slide agglutination tests. *E. Windle Taylor*

ARORA, K. L., IYER, S. N. & KRISHNA MURTI, C. R. **Effect of Sodium Chloride on Adenosine Deaminase, Serine Deaminase and Tryptophanase of *Vibrio cholerae*.** *Enzymologia*. The Hague. 1956, July 15, v. 17, No. 5/6, 333-7, 2 figs.

"1. The effect of supplementing the growth medium by NaCl on the production of adenosine deaminase, serine deaminase and tryptophanase of *Vibrio cholerae* has been studied. It has been found that the enzyme activities of the cells are stepped up considerably by NaCl.

"2. The effect of increasing amounts of NaCl in the suspending solution on the stability of adenosine deaminase, serine deaminase and tryptophanase has been studied. The salt appears to have a partial stabilizing effect on the enzymes."

FRETER, R. **Two Different Toxic Fractions extracted from *Vibrio cholerae*.** *J. Infect. Dis* 1956, Nov.-Dec., v. 99, No. 3, 207-11. [18 refs.]

Vibrio cholerae endotoxin was separated into acid-soluble and acid-insoluble fractions by extraction of organisms at pH 3.8 and 37°C., the supernate after centrifugation representing "crude acid-soluble toxin". The sedimented material was adjusted to pH 8.5, dried, ground with sand and extracted in saline at 0°C. to get "crude acid-insoluble toxin". On treatment of these fractions with chloroform and butyl alcohol, the acid-soluble toxin was found entirely in the supernate and the acid-insoluble toxin in the emulsion layer. Both toxin preparations were stable to heat (100°C. for 10 minutes) but lost toxic activity within a few days on standing at pH 7.0 in the refrigerator, the acid-insoluble fraction sometimes showing reduced toxicity within 18 hours. The acid-insoluble toxin was completely adsorbed on a mixture of anion and cation exchange resins, and had a higher N content (12-14% compared with 4.5-6.0% for the acid-soluble fraction), a lower lipid content (4% compared with 10%), a negative reaction for amino-sugars (positive for the acid-soluble fraction) and a higher LD₅₀ (0.35-0.75 mgm. compared with 0.05-0.10 mgm.) for mice. It is thought that the acid-insoluble toxin may represent the acid-soluble toxin bound firmly to a protein component which determines solubility as well as behaviour in chloroform-water emulsions. Extraction processes comparable with those used in this work are considered to be within the capacity of the infected human or animal body.

R. S. F. Hennessey

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

YOO, A. E. J. & EMERSON, G. A. **Effect of certain Dyes on Growth in vitro of *Entamoeba histolytica*.** *Texas Reports on Biol. & Med.* 1956, v. 14, No. 4, 464–9. [12 refs.]

The authors describe *in vitro* tests of 21 dyes on *Entamoeba histolytica*, grown in monobacterial culture on a modification of Balamuth's fluid medium. To produce the required concentrations (range 10^{-3} – 10^{-6}) the dyes were diluted in saline, and added to the medium before the inoculation of amoebae. The results of the tests were assessed by microscopic examination of the treated cultures after incubation for 48 hours at 37°C., when absence of motile organisms served as the criterion of amoebicidal action.

The action of the dyes in various concentrations per cent. was found to be as follows: naphthol green, auramine, pararosaniline and rose bengal were effective at 0.01 but not 0.001, while gentian violet, methyl blue, iodophthalein, azure A, Nile blue sulphate, celestine blue, toluidine blue and toluylene blue were effective at 0.1 but not 0.01, whereas malachite green, ethyl violet, methyl orange, Magdala red, xylene cyanole FF, azure C, Niagara sky blue, brilliant cresyl blue and Evans's blue proved to be ineffective at 0.1.

It is concluded that "Toxicity of possibly effective doses of the dyes studied probably precludes serious consideration of even the most effective dyes for clinical trial in amebic dysentery".

C. A. Hoare

HEINZ, H. J., BRAUNS, W. & MACNAB, G. M. **A New Antigen for the Amoebic Complement Fixation Test. Interim Report.** *South African J. Med. Sci.* 1956, July, v. 21, Nos. 1/2, 9–10.

Up to the present the complement-fixation test [CFT] for amoebiasis has produced disappointing results owing, on the one hand, to failure to produce pure amoebic antigen and, on the other hand, to the unreliability of the test itself, which may give cross-reactions with other parasitic infections and is liable to give inconsistent results with serum from the same patient.

The authors describe a new method of preparation of antigen and the results of the tests in which it was used. Antigen was prepared by exposing washed mixed cultures of *Entamoeba histolytica* to ultrasonic energy of a frequency of 800 kc. and 3 watts/sq. cm. of crystal contact surface (= total output of 20 watts) for 40 minutes. After disintegration

of the amoebae, the bacteria, etc., were removed by passing the solution through a Seitz filter, after which the filtrate was concentrated and titrated in parallel with a standard commercial antigen of *E. histolytica*. Preliminary tests of the new antigen were carried as follows: (1) with sera from patients with symptoms of amoebic hepatitis, (2) with sera from patients with intestinal amoebiasis, (3) with sera which gave negative results with the standard antigen (negative controls), (4, 5, 6) with sera which were positive to CFT for schistosomiasis, hydatid disease and syphilis, and (7) with anti-*Trichinella* rabbit sera. Positive reactions were obtained only in cases of hepatitis, but reactions were negative in cases of intestinal amoebiasis, as well as in groups 3-7, in which there were also no false positive reactions.

C. A. Hoare

HALL, B. & CARRUTHERS, H. L. **Observations on the Value of the Complement Fixation Test in the Diagnosis and Management of Amoebiasis.** *Med. J. Australia*. 1957, Jan. 12, v. 1, No. 2, 32-6.

Using commercial antigens of American origin, and also a locally prepared antigen, the authors have done complement-fixation tests [CFT] for amoebiasis on 206 patients, some with proven active amoebiasis, others with suspected but not proven amoebic disease, and yet others suffering from a variety of bowel diseases. Of 103 patients with suspected amoebiasis 25 were stool-positive for parasites and 78 stool-negative; in 68 of these either the sigmoidoscopic or the serological findings, or both, were positive. [Sigmoidoscopic evidence of amoebiasis appears to rest only on visual appearance.] CFT in 17 parasitically proven cases of amoebiasis gave 14 positive reactions and 3 negative; after specific treatment for the infection 13 of these 14 giving positive tests gave negative tests, while one of the 3 original negatives became positive. 10 persons with negative stool findings and negative sigmoidoscopic findings gave positive CFT, but for various reasons [set out in the text] it is considered that these persons were indeed infected, and that therefore these were not "false positives". In other cases in which amoebiasis was suspected, and sometimes even parasitologically proven, the CFT was negative when done with the commercial American antigens. When 61 sera were re-examined, with a locally prepared antigen, 40 of these gave the same reaction with each antigen; but 12 gave positive reactions with the Australian antigen and negative with the American, and 9 were positive with the American but not with the Australian antigens. The addition of regional strains in the preparation of an antigen for CFT in amoebiasis would therefore seem to be desirable.

The authors on analysing their results in some detail conclude that the complement-fixation test is of value from the diagnostic standpoint; it is diagnostically supportive, though without other evidence it cannot be regarded as diagnostic. A negative result with the CFT does not exclude the presence of an *Entamoeba histolytica* infection.

[The abstracter finds it difficult to justify a diagnosis of intestinal amoebiasis in the absence of demonstration of the parasite in the stools or in sigmoidoscopically-obtained material. The history, the clinical findings, and the sigmoidoscopic appearances, in the absence of this proof, provide an inadequate foundation on which to base such a diagnosis. In his opinion, therefore, in this paper there are some unjustifiable assumptions.]

A. R. D. Adams

RODRÍGUEZ, Obdulia. Amibiasis cutánea. (Comunicación de un caso.) [A Case of Cutaneous Amoebiasis] *Dermatología*. Mexico. 1956, July-Sept., v. 1, No. 1, 51-61, 6 figs. [35 refs.]

The English summary appended to the paper is as follows:—

“The author has reviewed the literature concerning this disease and presents her observation in a case in a male of 26 years with a perianal ulcerated painful lesion of three months evolution, in which *E. histolytica* was both identified in a direct smear of the exudate and in the histopathological sections. The patient was cured with emetine and diodoquin.”

NEVÁREZ VÁSQUEZ, C. & AVILÉS NUGUÉ, F. Amibiasis cutánea—Un caso de localización vulvar. [A Case of Cutaneous Amoebiasis affecting the Vulva] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1956, July-Sept., v. 13, No. 3, 197-207, 4 figs.

The first case reported from Ecuador. The location was in the vulva.

CHARMOT, G. Les troubles des constantes biologiques au cours de l'amibiase hépatique aiguë. [Changes in Biological Tests during Amoebic Hepatitis] *Bull. Soc. Path. Exot.* 1956, Sept.-Oct., v. 49, No. 5, 892-9. [18 refs.]

Laboratory investigations undertaken on 26 patients with acute amoebic hepatitis, both before and after treatment, gave results consonant with those resulting from an acute inflammatory reaction. There was almost invariably a polymorphonuclear leucocytosis, an increased sedimentation rate, an increase in the alpha globulin, and a strongly positive plasma formol-gel but a negative serum formol-gel reaction indicating an increase in blood fibrinogen. These changes were not found in intestinal amoebiasis. The usual laboratory tests for hepatic insufficiency gave irregular results, suggesting that the liver lesions are localized and that there is no diffuse hepatitis; this is supported by the clinical signs and symptoms of the condition.

In practice, serial determinations of the red-cell sedimentation rate are the only effective and essential guides to the progress of acute amoebic hepatitis.

A. R. D. Adams

SCHAIBLE, G. Über die Wirkung von Atebrin auf amöbenbedingte Lebererkrankungen. [**The Effect of Mepacrine on Amoebic Affections of the Liver**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1956, Nov.-Dec., v. 7, No. 4, 434-7. [14 refs.]

This paper concerns the use of Mepacrine for amoebic affections of the liver. In 21 patients in Sumatra, 14 of whom had amoebic hepatitis and 7 large abscesses of the liver, 71% (or 15) became symptom-free, 3 were improved and 2 unchanged with this treatment [this amounts to only 20 patients]. The regulation dose was 0.1 gm. mepacrine three times daily for 14 days. In acute cases larger doses up to 0.4 gm. were given daily for 5 days.

These results are contrasted with those obtained with resochin, resotren and resotren compound which produce something like 90% of cure. It is therefore recommended that mepacrine should be given in hepatic amoebiasis as a second string to chloroquine and its derivatives when they are not obtainable.

Philip Manson-Bahr

BEAVER, P. C., JUNG, R. C., SHERMAN, H. J., READ, T. R. & ROBINSON, T. A. **Experimental *Entamoeba histolytica* Infections in Man.** *Amer. J. Trop. Med. & Hyg.* 1956, Nov., v. 5, No. 6, 1000-1009. [18 refs.]

The authors have already recorded details of the strain of parasites and of the technical procedures they use in their work [see below]. 42 volunteers, in prisons, were successfully infected with the H strain of *Entamoeba histolytica* by swallowing 2,000 to 4,000 cysts. 4 other persons were infected on swallowing 10,000 to a million cysts; and 2 of 3 others who had spontaneously become free of previous infections were successfully re-infected. 33 additional volunteers were infected after various chemoprophylactic procedures, bringing the total successfully infected to 81. All of the 46 previously uninfected patients given doses of 2,000 or more cysts became infected. The periods between infection and the appearance of parasites in the stools of these ranged from 2 days to 4 months; all but 2 of them had positive stools within 2 weeks; in one case parasites did not appear until 126 days after infection, but thereafter were abundant.

The stools of 33 patients were examined daily for more than a month after infection and 86% of all stools were positive during this time, which in some of the patients exceeded a year. In one of the latter patients there were 3 periods of 4 to 7 months' duration when the stools were negative, but for the last 5 months of observation in this particular case they were consistently positive. Negative findings usually were few and widely scattered. Three people spontaneously lost their *E. histolytica* infections after 39, 61 and 62 days respectively (they remained negative

for 12-14 months' observation thereafter). One of these 3 patients proved refractory to re-infection with a dosage of 4,000 cysts, repeated after a week, but the other 2 became infected.

Regular close examination and enquiry failed to reveal any symptomatology or other evidence of pathogenicity resultant on these experimental infections. Nevertheless, the strain used caused characteristic pathogenic lesions on introduction by suitable means into dogs, guineapigs and rats, and its virulence in these did not differ from that of a strain of *E. histolytica* freshly isolated from an acutely dysenteric patient.

A. R. D. Adams

BEAVER, P. C., JUNG, R. C., SHERMAN, H. J., READ, T. R. & ROBINSON, T. A. **Experimental Chemoprophylaxis of Amebiasis.** *Amer. J. Trop. Med. & Hyg.* 1956, Nov., v. 5, No. 6, 1015-21. [18 refs.]

"Two amebicidal drugs, Milibis (bismuth glycolylarsanilate) and Diodoquin (5,7-diiodo-8-hydroxyquinoline) were administered in less than the recommended curative doses to human volunteers who, during the period of medication, were periodically challenged with 2,000 to 4,000 viable cysts of *Entamoeba histolytica* derived from a non-symptomatic carrier. Starting one week before the first of three weekly challenges and continuing for one week beyond the last, daily doses of Milibis ranging from 75 to 500 mg. were tested in groups of 8 individuals, with a like number of controls for each series of tests. All controls became infected within two weeks after the first inoculation. The highest dosage gave complete protection, the least failed entirely, and 5 of the 8 test subjects were protected by a dosage of 150 mg. All of the 8 subjects given 250 mg. daily for 28 days remained negative. Additional trials of 250 mg., using a 21-day course with inoculations of 4,000 cysts given at the end of the first and second weeks of medication, resulted in one apparent failure among 14 test subjects. However, when the same dosage (250 mg.) was given to the infected individual and to 8 infected controls, all of the infections were terminated.

"Similar experiments with Diodoquin resulted in complete protection of 9 individuals on 650 mg., 4 out of 7 on 325 mg., and 1 out of 3 on 210 mg. daily.

"In all of 8 individuals given Atabrine (quinacrine hydrochloride) in doses of 500 mg. daily for 2 days followed by 100 mg. daily for 21 days, inoculations resulted in infections as readily as in the controls. Chloroquine given in weekly doses of 500 mg., after loading doses of 500 mg. daily for 3 days, likewise had no apparent prophylactic effect on experimental amebiasis.

"Under usual conditions of exposure, effective prophylaxis of amebiasis probably can be accomplished by daily administration of 250 mg. of Milibis, or 650 mg. of Diodoquin, one-sixth to one-third the recommended curative doses. In the dosage recommended for suppression of malaria,

Atabrine and chloroquine apparently have no prophylactic value against amebiasis."

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

GÖNNERT, R. & MUDROW-REICHENOW, L. Parasitologische Studien an der Recurrensinfektion der Maus. [**Parasitological Studies on Relapsing Fever Infection in Mice**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1956, Nov.-Dec., v. 7, No. 4, 369-85, 3 figs.

The authors have made very detailed studies of the course of the disease in mice infected with an East African strain of *Spirochaeta duttoni*, with the object of developing a standard procedure for the evaluation of chemotherapeutic agents.

Various solutions were tested for the dilution of the infected blood used for inoculations and ordinary physiological saline was found to be the most satisfactory. The effect of the number of spirochaetes in the infecting dose was then investigated and a dose of 10^6 to 10^7 organisms inoculated subcutaneously was found to give fairly constant results.

The clinical effects of the disease in mice were then studied including changes in body weight, temperature and the number of erythrocytes. The body weight in a group of 43 mice dropped from an average of 19.7 gm. to 15.1 gm. in 5 days, and the number of erythrocytes from 8,500,000 to 4,500,000 per cmm., and the body temperature from 37.2°C. to 35.5°C. in the same period.

The number of spirochaetes in the circulation after 1 day's incubation period showed a rapid increase, reached a maximum about 3½ days after inoculation, and then showed a rapid decrease, the blood becoming negative by the end of the 5th day.

Three groups of mice were compared for their susceptibility to infection: Swiss, Australian—both inbred strains—and a group comprising various local strains. The inbred strains showed a much higher mortality—30% and 44%, respectively, as compared with 7% for the ordinary local strains of mice—but the course of the infection was similar in all of them.

The authors find that the changes in body weight, blood count, temperature and the numbers of spirochaetes in the circulation are highly significant and offer a basis for the evaluation of chemotherapeutic agents in *S. duttoni* infections.

Edward Hindle

YAWS AND OTHER TREPONEMATOSES

DA CRUZ-FERREIRA, F. S. & STERENBERG, H. **Some Aspects of Yaws in Liberia.** *Amer. J. Trop. Med. & Hyg.* 1956, Nov., v. 5, No. 6, 1036-50, 6 graphs.

It is estimated that there are some 600,000 cases of yaws among the 1,500,000 people in Liberia. The authors report a pilot survey in which 20,619 people were examined of whom 10,472 showed signs of yaws. The incidence of the disease increased in proportion to the distance of the villages from motor-roads. The only other environmental factor found to favour yaws was a high humidity. The authors record the incidence of clinical manifestations in different age-groups according to the nomenclature recommended by WHO [*Bull. Hyg.*, 1953, v. 28, 815]. The infrequency of the primary lesion being discernible is noted. Treatment schedules used were as follows (dosages in ml. 1 ml. PAM = 300,000 units):—

Age-Groups		Under 2	2-10	11-18	over 19
Schedule A	Infectious and Late	1	2	3	4
	Latent cases	nil	1	2	2
	Contacts	0.5	1	1.5	2
Schedule B	Infectious and Late	2	3	4	6
	Latent cases	nil	2	2	4
	Contacts	0.5	1	1.5	2

Follow-up surveys were performed in some villages 6 months after treatment; only 40% attended for re-examination. The results were as follows:—

Schedule	No. of patients re-examined	Percentage of			
		Cured	Improved	Same stage	Relapsed
A	300	56.3	29.3	13.7	0.7
B	850	64.6	23.4	11.9	0.1

Only 1 of 681 protected contacts was found to have an initial lesion. Observations were also made on dark ground examinations and serology in relation to the type of lesion, sex and age.

Among 757 persons without clinical signs of yaws, 46.6% were found to be sero-reactive. The majority of these are regarded as cases of latent yaws. Hyperkeratosis was the most frequent lesion in those over 2 years old, infectious lesions in those 2-10 years old.

[This is a valuable record of careful work which will form a basis for future campaigns. The authors do not state the frequency of the type of lesions which were least affected by treatment—presumably they were chronic hyperkeratotic lesions.]

Frederick J. Wright

- I. HACKETT, C. J. & GUTHE, T. **Some Important Aspects of Yaws Eradication.** *Bull. World Health Organization.* Geneva. 1956, v. 15, No. 6, 869-96, 3 figs. [11 refs.]
- II. SAMAME, G. E. **Treponematoses Eradication, with special reference to Yaws Eradication in Haiti.** *Ibid.*, 897-910.
- III. ZAHRA, A. **Yaws Eradication Campaign in Nsukka Division, Eastern Nigeria. A Preliminary Review.** *Ibid.*, 911-35, 2 figs.
- IV. SOETOPO, M., WASITO, R., SOEDARSONO, H. & TJOKRODIPO, D. **The Indonesian Treponematoses Control Project.** *Ibid.*, 937-58, 2 figs.

I. The eradication of yaws could be brought about by the removal of the conditions that favour its transmission. To await this happy state would mean many years of delay. The only sources of infection are the patients with infectious lesions and persons likely to develop infectious lesions, and the introduction of low-costing, long-acting procaine penicillin G in 2% aluminium monostearate (PAM) has made possible the earlier eradication of yaws.

This paper brings together the recommendations of WHO with amplifications based upon 7 years of experience of national yaws campaigns assisted by WHO and UNICEF in many parts of the world.

The relapsing nature of yaws means that a wider group of persons than those with active lesions should be treated to prevent the infectious relapses which will in turn give rise to further infections. Part of the initial planning of a yaws campaign should provide adequately for the development of suitable rural health facilities from which, in addition to their own very important more general preventive work, surveillance of the population, so necessary for the eradication of yaws, can be carried out after the mass treatment phase of the campaign is completed.

A mass campaign is one in which the activities are taken into the field to the people, and patients, and other groups of persons, are actively sought in the whole population. The following are certain of the principles of such a yaws campaign.

(1) At the initial treatment survey all the population available should be examined.

(2) Treatment with a single injection of long-acting penicillin (PAM) should be given at the same time as the survey. If the prevalence of active yaws is more than 10%, then, in addition to patients, all the remainder of the population should be given half doses as latent cases and contacts; this is total mass treatment. The maximal dose of PAM for adult patients is 1.2 mega-units (4 ml.); for patients under 15 years of age it is half that amount. With lower prevalences other treatment policies are recommended.

(3) Periodical resurveys are essential to maintain the results already obtained by the initial treatment survey. At these all active cases and the contacts of infectious cases are treated. These resurveys must be simple so as not to delay the progress of the campaign. They should be

continued at intervals of 6-12 months until the prevalence of active disease is low and adequate local facilities are available to continue the surveillance.

(4) All operations and records should be as simple as possible.

(5) The geographical expansion of the campaign should produce a compact area of control so as to reduce the risk of re-introduction of infectious cases.

(6) General rural health measures should be developed concurrently.

(7) The progress of the campaign should be regularly evaluated to ensure that it is fulfilling its declared purpose.

There must be adequate supervision of all aspects of the work. Mutual respect between the field workers, who are largely suitably trained auxiliaries, and the people is very important. Without the intelligent cooperation of the people the campaign will almost certainly not be successful.

The use of serological tests, because of the time and cost involved, is largely restricted to periodical sample surveys at the time of the clinical surveys and resurveys. They will measure the extent of the infection in the community after active disease has been greatly reduced and the changes observed will guide the development of the campaign.

Certain forms are attached to this paper which are recommended for recording:

(a) the total work done in a period,

(b) the prevalences of yaws at resurveys and at initial treatment surveys of the same populations.

[Important points in contemplating a yaws campaign in any endemic area are that much that is effective can be done at relatively little cost with relatively simple techniques, that international assistance is available if desired and that populations who have been rid of yaws by properly conducted campaigns are often awakened to the possibilities of modern public health, whose development is thereby encouraged.]

II. The campaign against yaws in Haiti started in 1950 and was one of the first national campaigns to receive international assistance from WHO in the form of technical advice and staff, and from UNICEF of penicillin, equipment, vehicles, etc.

The declared intention of this campaign is the eradication of yaws, by which is meant "a complete disappearance of all infectious cases from a country and the non-appearance of any primary autochthonous cases after the intensive campaign efforts have been terminated; in other words, the complete interruption of transmission". The difference between "control", whose objective is said to be "to reduce morbidity", and "eradication" is discussed and the present practicability and need for eradication are stressed. Many of the eradication techniques have been developed from the *Aedes aegypti* eradication campaigns.

The Republic of Haiti has a population of about 3.5 million people in

an area of about 10,000 square miles (25,900 km.²). In 1949 yaws was the major public health problem delaying the development of the country.

Several campaign methods were tried initially, such as permanent dispensaries and mobile clinics, but these were soon replaced by the house-to-house method of reaching all the population. The auxiliaries, who carried out the work, were carefully selected for physical fitness as well as for literacy and were given a thorough practical training. Much of the campaign was in mountainous country and necessitated very heavy work.

The field work was carefully supervised. The organization was excellent. The areas where the work was to be done were mapped and villages and houses were recorded; each house was numbered. Careful planning ensured that the penicillin reached each field worker when it was needed so that work was not delayed.

The treatment policy employed was to give all "cases", that is patients with active yaws and all persons who said that they had had yaws, 0.6 mega-unit (2 ml.) of PAM and to regard all the remainder of the population as "contacts" and to give them half that dose. [It is perhaps less confusing to regard these "contacts" as latent cases and contacts because many of them have already been infected. This campaign introduced the use of total mass treatment in anti-yaws work.] Each auxiliary carried his supplies and equipment, and stayed the nights in the field.

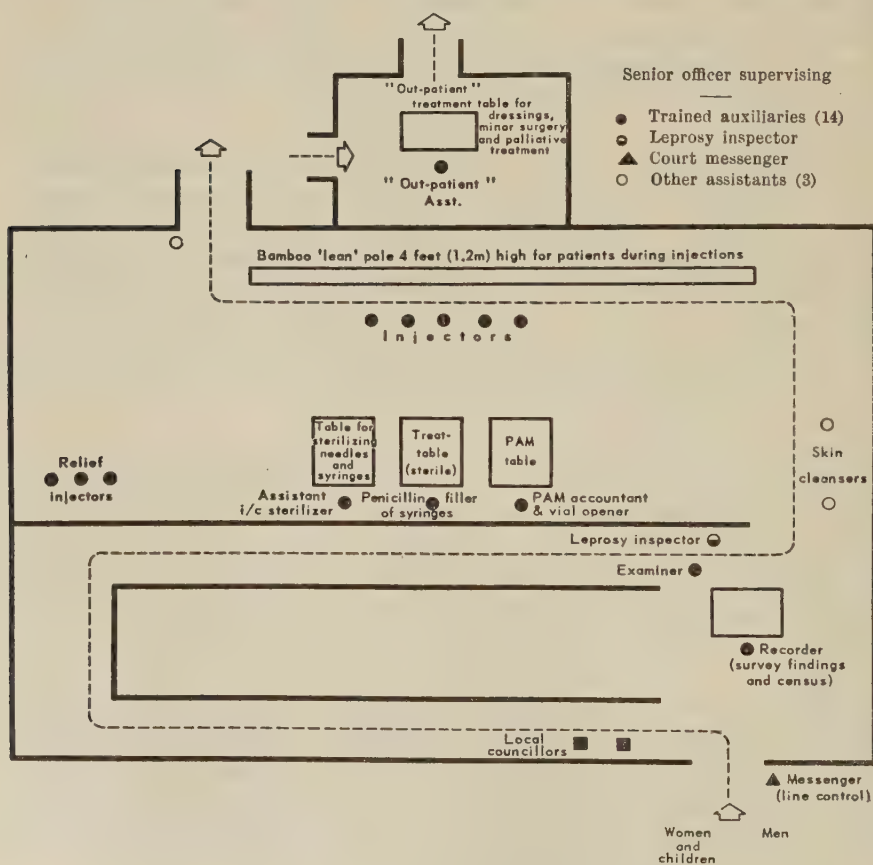
With these methods, between 95% and 100% of the whole population were examined and treated by the end of 1954. Random sample surveys widely dispersed throughout the Republic have shown that the prevalence of active yaws was reduced to 0.57% and of infectious yaws, diagnosed by microscopical demonstration of treponemes, to 0.15%. [The initial prevalence of yaws is not precisely known, but records show that 32.5% of the population received the larger injection of PAM 0.6 mega-unit as "cases".] Careful surveillance is being maintained to find and treat each infectious case as soon as it develops.

[In some countries other methods of reaching all the population than the house-to-house surveys have been found successful. In Haiti the house-to-house method has been found most effective perhaps because the rural population is widely scattered. In the initial surveys each auxiliary covered about 100 persons each day. At present the maximal doses for adult patients used in other campaigns are twice those used in Haiti.]

III. This is the outstanding yaws eradication campaign at present in Africa. It started in September 1953 and the national Government has received assistance from WHO and UNICEF; the Nsukka District has a population of about half a million in an area of about 1,300 square miles (about 3,400 km.²). The average density of the population is 342 people per square mile (132 per km.²) but in parts it is twice that figure.

In this campaign the field work is carried out by teams of 12-14 well-trained auxiliaries, many of whom are experienced in Field Medical Units or in the field work of the Sleeping Sickness Service. The examinations and treatment are carried out in a palm-frond enclosure divided by a central partition, which is built by the villagers. The people pass in an orderly line before one auxiliary who examines each in turn and calls out the diagnosis and the treatment ordered. These data are recorded by another auxiliary on a ruled chart from which the figures of the work of the campaign are derived. After the examiner each person comes to an inspector of the Leprosy Service who looks for signs of leprosy and marks the dose ordered on the shoulders with moist white chalk. During the survey of over 383,000 people 1,760 new cases of leprosy were found, 10% being lepromatous. As each person passes through the gap in the central partition another auxiliary scrubs, with soap and water, the right buttock in preparation for the injection.

LAYOUT OF WORKING PLACE AND DISPOSITION OF DUTIES IN A TEAM



Reproduced by kind permission of WHO.

In the treatment part of the enclosure the people stand facing towards one wall of the enclosure. At the other side of this part is a table at which 3 auxiliaries sit. One of these checks the number of 10 ml. vials of PAM as they are used and cleans the top before removing it. The next auxiliary pours the PAM into a 10 ml. syringe barrel fitted with a needle. The plunger is inserted and the filled syringe is ready for use. The injectors walk over to the people lined up for the injections and after each injection they replace the used needles by sterilized needles. A third seated auxiliary cleans and resterilizes the used needles. Finally the people leave the enclosure where there is a simple shelter at which any treatment or dressings ordered by the examiner or superintendent are carried out. The whole process is clearly seen in the following figure from the paper. Great care has been taken to earn the confidence and understanding of the people through the village councils.

At this campaign 95% of the actual population are seen at the initial treatment surveys, and an average prevalence of active yaws of about 15% and of infectious yaws of about 5% has been found. The treatment used was from 1.8, later reduced to 1.2 mega-units PAM (6-4 ml.) for adult patients, with smaller doses for children and 0.6 mega-units (2 ml.) for others.

Such teams work under the supervision of a field unit supervisor or a medical officer and each team will handle between 1,000 and 1,400 in a working day of 5-6 hours, that is about 100 per auxiliary per day.

The resurveys at intervals of 6 months are carried out by simply trained literate village youths called "yaws scouts". They "screen" the village, assisted by the village councillors and look for active cases of yaws. These and the contacts of the infectious cases are asked to present themselves at some particular part of a nearby road at a definite time and day, when the superintendent or the medical officer will check the diagnoses and give the necessary treatment. Nsukka is favoured by many good roads and the relative concentration of the population. The work of these yaws scouts has been shown to be effective by immediate resurveys by part of a team especially to check their work. A yaws scout can screen about 200 persons in a day.

At the 2 routine resurveys, 6-12 months after the initial treatment surveys, the prevalence of infectious yaws was found to have fallen to 0.1% and 0.05%. Most of the infectious cases were in persons who were absent at the initial treatment surveys. Relapses appeared to be few, but reliable data on this point were not available.

After the campaign, at the request of the villagers, an appreciable network of local health centres has been built and staffed, funds being provided by the Nsukka local authorities. From these centres the yaws scouts work, the surveillance will be continued and the future Rural Health Scheme will be developed.

[This successful campaign is an admirable example of all-round cooperation between the Government, the field staff, the people and

international organizations. The further development of the Rural Health Scheme should be watched with interest.]

IV. The Indonesian yaws campaign, concerned as it is with a great part of the population of the Republic of nearly 80 million, is the largest single yaws campaign in the world. It started in 1950 and, as in others of these early campaigns, several methods were tried before one was found that suited the conditions in the field.

The activities of the yaws campaign for some time have been based upon the subdistrict polyclinic. The subdistrict is the smallest civil administrative unit and has a population of about 25,000-30,000 in 15-25 villages. [On the average there are about 20 subdistricts to a regency and about 20 regencies to each of the 10 provinces in the Republic.] The polyclinic is staffed by a male trained nurse (*mantri* or *djuru-rawat*) and is being developed into the future rural health centre. [There are 2,800 subdistricts and 2,900 government polyclinics but not all subdistricts yet have a polyclinic. Anti-yaws activities are in progress in about 900 of these polyclinics.]

To the polyclinic is added an auxiliary, a simply trained, literate villager, the *djuru-patek* ["one-skilled-in-yaws"]. He visits each village in turn and, with the assistance of the village headman who draws up a census list of the population by households, examines all the population and notes all whom he thinks have active yaws. He does this for 4 days and on the fifth the polyclinic nurse accompanies him, checks his diagnoses and treats all whom he, the nurse, considers should be treated. Only patients with active yaws or with suspicious lesions are treated. This is the organization and work of the Treponematoses Control Project, Simplified (TCPS) which is now the basis of the whole campaign. It was developed in response to the limited resources available for this purpose.

When one village is completed the work is continued in the next. When the whole subdistrict has been done the *djuru-patek* starts at the first village again. About 6-8 months are required to cover a whole subdistrict. Two valuable characteristics of this campaign are that resurveys are automatic and that this campaign is integrated into the existing health services from its beginning.

The average percentage of the population seen at the yaws surveys is over 70% and in some subdistricts has been nearly 100%. The people in numbers adequate for the *djuru-patek* to examine in one day are called together to the village headman's house. This gathering together is a custom for many purposes in Javanese villages. The house-to-house method, when it was tried in Indonesia, has given no better results and is not well received by the people. The dosage of PAM was at first 2 injections of 1.2 mega-units (4 ml.) a week apart. This has been reduced as evidence of trials became available and now the maximal dose for an adult patient is a single intramuscular injection of 1.2 mega-units (PAM).

The results of the campaign are that the prevalence of active cases is

found reduced at each resurvey. By about the third to fourth survey, about 30 months after the start of the campaign in that subdistrict, the prevalence has usually fallen below 2% and nearly all the population have been seen at least once. The higher the percentage of the population seen at each survey and the higher the initial prevalence, the more marked the decrease. When in a subdistrict at a periodical resurvey, over 80% of the population are seen and the prevalence of all active yaws has fallen below 2% and of infectious yaws below 0.5%, then that subdistrict is ready for consolidation. Resurveys then cease and a system of careful and thorough surveillance is introduced to ensure the early detection and treatment of each infectious case as it arises.

Many careful investigations of value in the campaign have been carried out in Indonesia. One of these showed that treatment of household and school contacts did not accelerate the fall of prevalence unless the initial prevalence was so high that other measures would have been used more effectively. Total mass treatment, that is treatment of all the population without active yaws in addition to the treatment of all active cases, is carried out when the prevalence is over 30% or, regardless of the prevalence, in areas which are difficult of access or where the population is dispersed or nomadic.

Serological studies have shown that the proportion of active cases to reactors to the serological tests for syphilis changes after treatment. Often initially, if the population has not had much previous treatment, this proportion is 1 to 2 but one and two years after the start of mass treatment this may be 1 to 9 and 1 to 12. Another study showed that 4 years after treatment by PAM 1.2 mega-units in 2 injections 2 weeks apart, sero-reversal had only occurred in 20% of 82 cases although there had been a considerable reduction in titres in most of the others.

The importance of health education, surveillance in which very comprehensive action is taken, and the development of both curative and preventive services in rural areas is well recognized in Indonesia, and these activities are taking place about the subdistrict polyclinic.

[In Indonesia the polyclinics in the subdistricts have been an essential part of the health services for many years. The yaws campaign is part of the duties of the polyclinic staff. Although only patients are treated in the campaign and the fall in prevalence is slower than if total mass treatment had been carried out, it is nevertheless progressive and with the admirable plans of the Indonesian Ministry of Health there is no reason, under existing conditions, why eradication of yaws should not be achieved as in other yaws campaigns.]

C. J. Hackett

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

FENTON, R. L. & AUSTIN, F. H. **Indeterminate Leprosy acquired during Military Service. Report of a Case and Review.** *Arch. Intern. Med.* 1957, Feb., v. 99, No. 2, 290-93, 4 figs.

A case in a U.S. Army officer who had served in the Philippines 7 years earlier. [See also this *Bulletin*, 1955, v. 52, 51.]

MUIR, E. **Relationship of Leprosy to Tuberculosis.** *Leprosy Review.* 1957, Jan., v. 28, No. 1, 11-19.

The mycobacteria have been regarded as constituting a range or "continuous spectrum" of organisms beginning with the saprophytes and ascending to *Myco. tuberculosis* (pathogenic but cultivable *in vitro*) and to the culmination in *Myco. leprae* (pathogenic for man only, and not as yet cultivated *in vitro*). *Myco. leprae* is destroyed by phagocytosis in resistant persons, but in susceptible subjects it multiplies in the cytoplasm; it also seeks the peripheral nervous system, in this differing from all other known bacteria.

The author discusses the immunology of leprosy and tuberculosis. The lepromin test is not like the tuberculin test (which indicates past infection); it gives positive results in the resistant forms and its chief use is in prognosis, but it is also positive in a proportion of persons who have had no contact with leprosy. BCG can convert a negative to a positive lepromin reaction, but it is not yet known if a positive reaction induced in this way has the same significance as the positive reaction found usually in tubercloid leprosy. Leprosy and tuberculosis differ clinically and pathologically. The lung "is entirely exempt in leprosy". The cutaneous nerves are affected in leprosy of the skin, but only rarely in tuberculosis. Eyes and bones are affected by both, but the reactions are different. The greatest contrast between the diseases, however, is in the action on the nervous system; leprosy attacks the peripheral nerves, tuberculosis attacks the central nervous system.

The author sums up to the effect that in tuberculosis the type of disease depends partly on the strain of bacillus and partly on the resistance of the host; in leprosy there is no indication of differing strains, and the type of disease depends entirely on the resistance of the subject. Virulent *Myco. tuberculosis* attacks the cells, paralysing them and forming an extracellular medium in which it can multiply. *Myco. leprae* "lets itself be ingested by the cell" and multiplies in it. "Thus the acute tubercular lesion is typified by tissue destruction, the severe leprosy lesion by granuloma, either diffuse or nodular."

The author points out that sulphones are useful in experimental tuberculosis and in leprosy, but not in clinical tuberculosis or rat leprosy; isoniazid is valuable in clinical tuberculosis and rat leprosy but of little value in human leprosy.

Charles Wilcocks

FERNÁNDEZ, J. M. M. **Leprosy and Tuberculosis. Antagonistic Diseases.**
Arch. Dermat. 1957, Jan., v. 75, No. 1, 101-6. [18 refs.]

In framing the hypothesis of antagonism between leprosy and tuberculosis and its basis, the author, from Rosario, Argentina, considers 3 age periods for persons exposed to infection from an open leprosy focus: early infancy, more advanced infancy and adolescence, and adult age. In the first period there is the possibility of "specific spontaneous immunization" with, in the author's experience, only 32% of children of lepromatous patients becoming infected, and as many as 77% of these cases being benign. In the second age period there is very little possibility of specific spontaneous immunization and a previous protective tuberculous infection is infrequent. Clinically sound lepromin- and tuberculin-negative subjects and persons with lepromatous leprosy predominate. In the adult period "spontaneous unspecific immunization" following a previous protective tuberculous infection is very frequent with, in the author's experience, 18% of spouses of lepromatous persons becoming infected but 87% of these having only the benign form of the disease.

It has been argued that if a previous tuberculous infection protects from lepromatous leprosy there should be among lepromatous subjects a predominance of tuberculin-negatives and among tuberculoid cases a predominance of tuberculin-positives. But against this, three points have to be considered: without tuberculous infection there can be sufficient specific resistance to leprosy so as to produce only the tuberculoid type; in a lepromatous patient with positive tuberculin reaction it is not always possible to tell whether his tuberculosis or his leprosy infection was first acquired; in the tuberculin-negative lepromatous patient the same factor may inhibit both the tuberculin and the lepromin reaction.

After discussing the clinical and epidemiological bases of this hypothesis, the conjugal evidence is considered. Out of 190 married couples, one of each pair being an open case of leprosy, there were 38 contact infections, but of these only 5 were lepromatous. The reason suggested for this low index of infection and high proportion of benign cases is that among the husbands or wives exposed to infection tuberculin-positives predominate, the index of positive tuberculin in the adult population in Rosario being 75%.

The author proposes 6 lines of study for the elucidation of the question of antagonism between these 2 diseases: (a) a comparative study of the clinical and immunological development in tuberculin-negative, tuberculin-positive and BCG-treated persons living in contact with leprous patients;

(b) an investigation of the tuberculin-positive index in rural and urban districts and of the leprosy index and predominating type; (c) a study of conjugal leprosy and its relation to tuberculin allergy; (d) a study of the proportion of the infections and types of leprosy among the tuberculin-positive and tuberculin-negative immigrants who settle in endemic zones; (e) a study of the development of tuberculin sensitivity among leprosy patients in hospital; (f) a comparative study of the development of a tuberculous infection in tuberculoid and lepromatous patients.

[This clearly-argued article is worthy of careful study in the original by all those interested in the relationship of tuberculosis and leprosy.]

Ernest Muir

CAMPOS, N. S., ROSEMBERG, J. & AUN, J. N. Significado patogênico da correlação dos resultados das reações lepromínica e tuberculínica em comunicantes de lepra. Lepra infecção. Lepra doença. Lesão de inoculação. (Complexo primário?) [**The Pathogenic Significance and Correlation of the Results of Lepromin and Tuberculin Reactions in Leprosy Contacts. Leprosy Infection. Leprosy Disease. The Possible Primary Lesion connected with the Point of Inoculation**] *Rev. Brasileira Leprologia*. S. Paulo. 1956, Sept., v. 24, No. 3, 1-15. English summary.

A study of children in leprosaría, who had been separated from parents suffering from lepromatous leprosy, shows that of those who develop the disease 50% develop it in the first year and 90% within the first 3 years. The children's resistance to leprosy is studied with the help of the lepromin and tuberculin tests. The great majority showed a positive lepromin reaction either without signs of leprosy or with small tuberculoid lesions, which later tended to clear up spontaneously. A smaller number were lepromin negative, and these were considered to be in a state of "leprosy infection" which tended to evolve into the indeterminate or lepromatous form of leprosy, their prognosis being particularly bad if the tuberculin reaction was positive.

It is argued that all these children who have been in close contact with open leprosy are in a state of "leprosy infection", the infection possibly being in the lymph nodes connected with the point of entry of the bacilli; that during the early years of life there is a natural resistance, possibly inherited from the parents, but which is transitory; that in the great majority of children before this transitory resistance disappears its place is taken by an acquired resistance induced by either leprosy or tuberculosis infection or by both; in the minority, in whom this acquired resistance does not develop, indeterminate or lepromatous leprosy tends to evolve. In favour of this hypothesis is the fact that leprosy very seldom appears in early infant life.

Ernest Muir

BLUM GUTIÉRREZ, E. Estudio del estado inmunoalérgico de la lepra en nuestro medio. [**A Study of Immunity to Leprosy in Ecuador**] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1956, July-Sept., v. 13, No. 3, 241-64, 1 graph & 1 map. [10 refs.]

A study of reaction to lepromin in 4 towns of Ecuador where leprosy is prevalent showed that they had a lower rate of lepromin positives than the city of Guayaquil and other areas where leprosy is not common. This is explained by the fact that tuberculosis (and BCG vaccination) is more common in the latter populations producing positive lepromin reactions, whereas in the leprosy areas these reactions reflect the incidence of leprosy only, which is less. The surveys also showed a very low lepromin positive rate in the first year of life, but it rises steadily to the age of 50 and then drops again. The rise is particularly rapid in the 1- to 5-year age-group. Mass BCG vaccination is recommended, as well as dispensaries for treatment of all closed cases and sanatoria for isolation of all open cases.

Ernest Muir

ZAMUDIO V., L. Algunos problemas quinesiología de las manos de los enfermos hansenianos. [**Some Kinesiological Problems relating to the Hands in Leprosy**] *Dermatología.* Mexico. 1956, July-Sept., v. 1, No. 1, 23-50, 22 figs. & 1 diagram. [26 refs.]

The English summary appended to the paper is as follows:—

“After pointing out the outstanding features of the normal anatomy and physiology of the hand and outlining the modern concepts of leprosy, the author analyses the paralysis, deformities and handicaps that leprosy leaves after the invasion of the main trunks of the upper extremities by Hansen's bacillus.

“A kinesiologic study of these paralysis and deformities is given and the treatment of them is discussed using the techniques established for the management of patients with the same type of handicaps but produced by other causes (trauma and poliomyelitis).”

WOZONIG, H. Die Knochenveränderungen bei Lepra. [**Bone Lesions in Leprosy**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1956, Nov.-Dec., v. 7, No. 4, 464-71, 8 figs. [13 refs.]

The English summary appended to the paper is as follows:—

“Bone lesions in 50 leprosy patients have been studied by x-ray examination in order to evaluate their diagnostic significance. The terminal phalanges of fingers and toes, which are particularly involved, undergo slow atrophy and resorption. These changes result from trophic disturbances secondary to neural involvement and are considered to be non specific. They are modified, however, by accidental injuries such as

trauma, periostitis, osteomyelitis, pathologic fractures and arthroses. Hence, advanced lesions exhibit a protean picture which appears to be highly characteristic of leprosy."

FLOCH, H. & MAILLOUX, M. Sur les réactions lépreuses et leur pronostic. [**Leprosy Reactions and their Prognostic Value**] *Bull. Soc. Path. Exot.* 1956, Sept.-Oct., v. 49, No. 5, 867-74. [14 refs.]

After discussing the prognostic value of reactions occurring in different forms of leprosy, and the opinions of various leprologists as to the value and danger of lepromatous reactions, the authors describe the effects of reaction in 26 lepromatous patients, comparing them with 26 control patients who did not suffer from reaction. Of the reacting patients the 17 who were either bacteriologically negative or nearly so all improved; while of the 9 more strongly bacteriologically positive the condition was aggravated in 7 and 2 died. Among the controls the course of the disease was practically the same, except that there was no death.

The authors consider that the erythema nodosum induced by sulphone treatment is generally accompanied by improvement, as is also apparently the case in the "reversal reaction" of Wade. Naturally occurring lepra reaction if it cannot be controlled may be very dangerous. Artificially induced reaction as by means of potassium iodide or smallpox vaccination may be useful if the reaction can be controlled, but for this it would be preferable to use iodide rather than vaccination. *Ernest Muir*

SAMUEL, P. S. **Colchicoside in the Treatment of Lepra Reaction.** *Leprosy in India.* 1956, July, v. 28, No. 3, 80-82.

FLOCH [this *Bulletin*, 1955, v. 52, 54] reported encouraging results with colchicoside in the treatment of lepra reaction. The present author had been using potassium antimony tartrate (PAT), mercurochrome or Fantorin (Glaxo). He therefore tried colchicoside in 12 lepromatous patients with reaction, some of whom had previously had the other forms of treatment. He gave 2 daily doses of 1 cc. (5 mgm.) each intravenously and then 2 cc. doses (10 mgm.) daily up to a total of 18 cc. (90 mgm.).

The results are given in a table. Two children appeared to improve, but most of the patients did not and many felt worse. Some had previously responded to PAT and did so again after the colchicoside was stopped. A common complaint of patients receiving colchicoside was severe joint pain, especially in the knees and elbows. A few deep-seated nodules disappeared with this treatment, but the patients concerned stated that they preferred PAT.

The author concludes that colchicoside treatment is no improvement on existing methods of treating lepra reaction.

H. J. O'D. Burke-Gaffney

CONTRERAS, GUILLÉN, TERENCIO & TARABINI. Nuevos tratamientos en las leprorreacciones. [New Forms of Treatment of Lepra Reaction] *Rev. "Fontilles"*. Valencia. 1956, July, v. 4, No. 2, 59-71, 8 graphs. English summary.

4 lepromatous patients who had been suffering for lengthy periods from severe lepra reaction which had not yielded to other forms of treatment were given aureomycin every 3 to 4 hours to the total of 800 to 2,000 mgm. daily for 10 to 14 days. In three of these the reaction yielded within a few days and has not recurred during periods of several months. The fourth patient did not benefit, nor was there any benefit from later treatment with cortisone.

Four preparations of polyvidone (Periston, plasmovinil, Toxobin and Atossivinil) were tested in lepra reaction and nephritis in 14 patients. Periston and Plasmovinil with high molecular weight (30,000) were found the more effective. They can be injected subcutaneously, intramuscularly or intravenously. Of the 14 patients treated all the symptoms disappeared within 1 to 4 days in 5 who were suffering from lepra reaction, and 4 others with neuritis got relief from pain. In the 4 patients with renal sclerosis there was diminution of urea, improved diuresis and general improvement.

In 20 reacting patients treated with gamma globulin there was immediate improvement in 1, some amelioration in 3, but no improvement in the others. In 6 patients treated with succinic acid there was no improvement.

Ernest Muir

FLOCH, H., DEHEZ, Françoise & MAILLOUX, M. Une seule administration hebdomadaire par la voie buccale d'un mélange sulfone-mère-sulfone dipropylée est possible en thérapeutique antilépreuse. [It is possible to treat Leprosy with a Single Weekly Oral Dose of a Mixture of Parent Sulphone and Dipropyl Sulphone] *Bull. Soc. Path. Exot.* 1956, Sept.-Oct., v. 49, No. 5, 855-67.

The authors found that dipropyl sulphone is less rapidly excreted than DDS. After experimenting with various amounts and proportions of these two substances, they found that a single weekly oral dose of 300 mgm. of DDS with 700 mgm. of the propyl derivative maintained a sufficiently high blood concentration of sulphone throughout the week, and was well tolerated by the patients. It was found to be as effective as giving DDS twice weekly. It is important that the dosage recommended should be gradually reached, say in the course of 3 months.

Another method of treatment is to give monthly injections of DDS suspended in agar saline, supplemented by the oral mixture described above in the fourth week of the month.

Ernest Muir

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Ernest Muir

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Another method of treatment is to give monthly injections of DDS suspended in agar saline, supplemented by the oral mixture described above in the fourth week of the month.

Ernest Muir

GEORGES, A. & SARTON, B. Contribution à l'étude d'une technique de dosage de la sulfonémie chez l'homme. [**Observations on a Technique for Estimating Blood Levels of Sulphones in Man**] *Ann. Soc. Belge de Méd. Trop.* 1956, Oct. 31, v. 36, No. 5, 537-44, 1 graph.

GEORGES, A. & LECHAT, M., with the technical assistance of B. SARTON & F. STOUFFS. Étude de la sulfonémie après administration d'une préparation de D.D.S. solubilisée à des lépreux. [**A Study of Blood Concentrations of Sulphones after administering a Preparation of Dissolved DDS to Leprous Patients**] *Ann. Soc. Belge de Méd. Trop.* 1956, Oct. 31, v. 36, No. 5, 525-36, 4 graphs. [11 refs.]

This preparation consists of DDS dissolved in a special excipient [the nature of which is not mentioned]. This solution is injected intramuscularly and causes neither pain nor induration locally. Weekly injections were given in two groups of patients, 500 mgm. being given in the one group and 1.0 gm. in the other. In the former the blood concentration rose within a few hours to 4 or 5 mgm. per litre, falling less rapidly but not to less than 1 mgm. on the 7th day. With 1.0 gm. injections the concentration rose to 7 or 8 mgm. per litre rapidly, but did not fall below 2 mgm. on the 7th day. Other advantages over suspensions of small crystals of DDS are that the syringe piston does not tend to stick and the needle does not become blocked. Because of the well-controlled blood concentration and the steady and painless absorption from the site of injection it is presumed that there will be powerful bacteriostatic action without fear of toxic effects.

Ernest Muir

CHATTERJEE, K. R. & PODDAR, R. K. **Radioactive Tracer Studies on Uptake of Diamino-Diphenyl-Sulphone by Leprosy Patients.** *Proc. Soc. Exper. Biol. & Med.* 1957, Jan., v. 94, No. 1, 122-5, 1 fig.

In this experiment DDS tagged with ^{35}S was used, giving an oral dose of 4 μC /mgm. Blood was examined at 1, 2, 4, 6, 10 and 24 hours after administration, and then at 24-hour intervals as long as the presence of the drug could be recorded. Urine was examined at 24-hour intervals, pooled specimens being used. Bone-marrow, healthy and diseased skin were taken for examination by biopsy.

In all, 8 lepromatous and 14 non-lepromatous patients were examined. About 76% of the DDS was excreted in the urine within 6 days. The concentration in the bone-marrow was similar to that in the blood. After 18 hours the concentration in the healthy skin was about the same as in the blood. The "uptake of the drug by the affected tissues was always about 10 times greater than that of healthy tissues". This greater concentration was also found when the drug was injected subcutaneously about 4 inches away from the affected tissue examined. Concentration

of the drug in the blood reached its maximum in about 6 hours, but the total quantity of the drug in the blood constituted only about 8% of the total dose. The corresponding concentration in the blood was only about 0.6 mgm. per cent. As the solubility of DDS in water is 10 mgm. per cent., it is suggested that it is first localized in the cells of the gastrointestinal tract from which it is more slowly taken up into the blood. In the affected skin of 1 biopsy, taken 14 days after administration of the drug, DDS was found, though it had not been detectable in the blood or urine for some days before the biopsy. "It may, therefore, be concluded that the drug was localized in affected tissues from where it is slowly excreted through excretory organs."

The authors deal in this paper with the first part of their investigation; the second part has to do with the localization of the drug in affected tissues and invading organisms. [This paper is one of considerable importance, opening up new and promising methods of investigation.]

Ernest Muir

DE ALMEIDA, J. O., CARVALHO, R. P. S. & PADRON, C. **Complement-Fixing Antibodies in the Sera of 534 Lepromatous Lepers under Treatment with Sulfones.** *Rev. Brasileira Leprologia.* S. Paulo, 1956, Sept., v. 24, No. 3, 17-26. [16 refs.]

"Complement fixing antibodies were titrated in sera from 534 lepers; 74 were recent arrivals in the hospital; all of them had bacilli in lesions and mucous; 19% presented titers less than 10; 51% had titers between 10 and 100 and 30% had titers higher than 100. The second group included 217 patients under treatment; titers were distributed as follows; 33% less than 10; 52% between 10 and 100 and 15% higher than 100. The third group was comprised of 243 cured cases; titers less than 10 occurred in 70%; 27% had titers between 10 and 100 and 3% was higher than 100."

REZETTE, J. Essais de traitement des ulcères et des maux perforants lépreux par le déhydrocholate de sodium. [**Treatment Trials of Ulcers and Perforating Ulcers with Sodium Dehydrocholate**] *Ann. Soc. Belge de Méd. Trop.* 1956, Oct. 31, v. 36, No. 5, 581-7.

This preparation is supplied in ampoules each containing 5 cc. of a 20% solution, and is administered by slow intravenous injection. For recent ulcers which are fairly superficial 1 ampoule is given daily. For those of longer duration, including perforating ulcers, injections are given twice daily. Injections are continued till amelioration is established. In 5 recent ulcers there was complete healing after injection of 26 to 40 gm. In 3 ulcers of long standing there was amelioration, with a

maximum dose of 27 gm. In 10 perforating ulcers there was complete healing in 2 and various degrees of amelioration in the rest. The injections cause a rise of temperature to as much as 39°C., lasting 5 or 6 hours. The action of sodium dehydrocholate is supposed to be due to increase in the flow of blood circulation and dilatation of blood vessels. There may be a bitter taste in the mouth after injections, and this is sometimes followed by nausea, so that injections should be given fasting.

Ernest Muir

CAMPOS, N. DE S. O BCG na profilaxia da lepra. Positividade espontânea—Positividade em seguida à reinoculação do antígeno de Mitsuda—Resultados práticos até agora observados. [**BCG in the Prophylaxis of Leprosy. Spontaneous Positivity. Positivity following Reinoculation with Mitsuda Antigen. Results of Practical Observations up to Date**] *Rev. Brasileira Leprologia*. S. Paulo. 1956, Oct.-Dec., v. 24, No. 4, 173-87. [26 refs.]

The author argues against those workers who consider that the lepromin test becomes positive only spontaneously and who throw doubt on the effect of BCG in making it positive. He writes in favour of the many workers whom he quotes as showing the value of BCG in raising resistance to leprosy. He then records his own results at the Ambulatory Unit of the Department of Leprosy Prophylaxis at São Paulo. Since 1952, among 12,000 leprosy contacts vaccinated with BCG up to date, 91 cases of leprosy have occurred. Out of these, 3 were lepromatous, 13 indeterminate and 75 tuberculoid, that is in the proportions of 3·3%, 14·4% and 82·3%. Compared with these, out of contacts who were not vaccinated 590 developed the disease, and of these 237 were lepromatous, 217 indeterminate and 136 tuberculoid, giving respective percentages of 40·1, 36·7 and 23·1. The significant point is the proportions of tuberculoid type patients in the two groups: 82·3% in the vaccinated and only 23·1% in those not vaccinated. This appears to indicate considerably higher resistance in the vaccinated group.

Ernest Muir

SOARES, A. C. La lutte anti-lépreuse et l'hygiène mentale. [**The Anti-Leprosy Campaign and Mental Health**] *Bol. Serviços de Saúde Pública*. Lisbon. 1956, July-Sept., v. 3, No. 3, 377-90. English summary.

The author stresses the importance of not losing sight of the personality of the patient suffering from leprosy while dealing with his physical condition. In the treatment of patients in leprosy colonies there should be not only the leprologist but also those in charge of the mental, social and spiritual aspects of the disease. Children in the early stages of

leprosy should not be brought in contact with advanced disfigured patients.

A small number of people in the community are responsible for the spread of the disease and it is the duty of public health authorities to seek out these patients, but in doing so their mental condition and personalities must be taken into account and respected. If the campaign against leprosy is to succeed it must be based upon diffusion of knowledge about hygiene and prevention in such a way that it may be understood by all classes of the community whatever their age, education, etc. When patients are examined for leprosy their mental state should be assessed at the same time, and all doctors employed in this work should first receive instruction in mental diseases. This is in line with the recommendation of the World Health Organization that public health services should be adapted to include programmes of mental health.

Ernest Muir

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (schistosomes, other flukes); CESTODES (Diphyllbothrium, Taenia, Echinococcus, other cestodes); NEMATODES (Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).

STIMMEL, Carolyn & SCOTT, J. A. **The Regularity of Egg Output of *Schistosoma haematobium*.** *Texas Reports on Biol. & Med.* 1956, v. 14, No. 4, 440-58, 3 figs. [11 refs.]

The material for this statistical study was obtained as a result of examining virtually all the urine passed by two male volunteers who were found to have *Schistosoma haematobium* ova in their urine, but who showed little or no clinical evidence of infection.

Case 1. "The study was begun on March 12, 1931. The total urine output for each 24 hour period was collected in a single container during the first 13 days of the study. For the next 31 days the subject was instructed to divide collections into night and day periods, the night period including the time following a urination at 1600 hours through the first morning specimen, usually passed at about 0630 hours. The specimens passed following the first morning specimen through one at 1600 hours constituted the day period. For the final 10 days of the study he was instructed to urinate according to normal habits, passing each specimen into a separate container and recording the time of passage."

"Case 2 . . . was infected with both *S. haematobium* and *S. mansoni* but the eggs of the latter species were always very few in number. The records analyzed here include only *S. haematobium* eggs passed in the urine. He showed minimal symptoms of the infection. The study of this case began on May 15, 1931, and continued for 10 days, following the same schedule as did Case 1 for the final 10 days."

Although it is generally recognized that the most reliable estimate of the number of eggs produced by an infected individual is based on the average daily output taken over a long period of time, nevertheless, previous records of this nature have seldom been published. In the present paper the authors have made available such an average based on 54 consecutive days in one case and on 10 days in the other. The results of these long and intensive examinations are recorded under four headings, and may be summarized briefly as follows:

(1) *The average daily output of schistosome eggs.* The average daily output of Case 1 was 8,440 eggs per day, and of Case 2 was 50,497. The daily findings are presented graphically and subjected to a statistical analysis.

(2) *Egg output for day and night periods.* In Case 1, the egg output in the urine passed during the night was compared with that passed during the day. The mean output of eggs, when expressed as eggs per unit volume of urine, for the day period was found to be more than 3 times that for the night period. "It is clear, then, that real differences existed between the egg output at night and that during the day. The most obvious explanation seems to be that the differences are somehow related to differences in the degree of activity of the individual."

(3) *The diurnal cycle of egg output.* When the number of eggs per specimen and the unit volume per specimen for the two cases were plotted on a time scale, a diurnal cycle was noted. "The point of greatest interest, which has been pointed out previously, is well substantiated by this analysis, namely that the long period between specimens during sleep results in large urine volume and small numbers of eggs. With increasing activity during the day and more frequent passage of small urine specimens there is a resultant high egg output."

(4) *Evaluation of a single specimen of urine as a means of estimate.* The conclusions reached by the authors are of particular interest to the epidemiologist, as compared with the clinician. "This problem of making a positive or negative diagnosis is of primary importance to the clinician. It is also important to the epidemiologist, but whereas the clinician deals with the individual case, the epidemiologist deals with groups of cases. The epidemiologist does not need to identify every positive case, but can collect data for the purpose of mathematically correcting deficiencies in the prevalence rates. . . .

"As far as the variability of egg output is concerned a single specimen or even part of a specimen from enough people to represent a cross section of a population should be sufficient to estimate the average level

of the output in the population. Other studies will be needed to show that such an estimate is correlated with the amount of damage being done by the infections."

[See also GERRITSEN *et al.*, this *Bulletin*, 1953, v. 50, 730.]

R. M. Gordon

SCHWETZ, J. **Some New Comparative Investigations on Three *Physopsis* Borne Schistosomes: *Schistosoma haematobium*, *S. bovis* and *S. intercalatum*.** *Amer. J. Trop. Med. & Hyg.* 1956, Nov., v. 5, No. 6, 1071-85, 1 map & 4 figs. [17 refs.]

"The three schistosomes transmitted by *Physopsis* are morphologically identical but differ in the shape of the eggs: *S. haematobium* eggs are round or oval; *S. bovis* long and spindle shaped, *S. intercalatum*, elongate and slender with a long, slender spine. In spite of the similarity of the parasites and the sharing of the snail host they produce completely different diseases. *S. haematobium* causes bilharziasis only in human beings, reproducible experimentally in primates. *S. bovis* causes an intestinal bilharziasis (and occasionally a concomitant vesical bilharziasis) in cattle, sheep and goats which can be experimentally transmitted to small laboratory animals. *S. intercalatum*, found in certain wooded regions, causes an intestinal bilharziasis in human beings which can also be experimentally transmitted to small laboratory animals. In addition, the transmission of *S. intercalatum* to sheep and goats has been confirmed.

"Since some ovides in South Africa have been found naturally infected with *S. mattheei*, a species or variety closely resembling *S. intercalatum*, the question arises as to whether we may not be dealing with the same schistosome, varying a little in its morphology in different hosts, human or animal. We shall abstain from giving a definite answer to this question, but we wish to point out that the eggs of *S. intercalatum* found in the feces of our experimentally infected goat and sheep were morphologically identical to the eggs of *S. intercalatum* found in human feces."

CRIDLAND, C. C. **Further Experimental Infection of Several Species of East African Freshwater Snails with *Schistosoma mansoni* and *S. haematobium*.** *J. Trop. Med. & Hyg.* 1957, Jan., v. 60, No. 1, 18-23, 1 map.

The experiments reported in this paper form a second series [this *Bulletin*, 1955, v. 52, 797] in the investigation of the susceptibility of East African molluscs to infection with schistosomes. The conditions of experimental snail infection were uniform; all snails were laboratory bred and each was exposed to 10 miracidia of *Schistosoma mansoni* or *S. haematobium* according to snail species. The snails were examined

periodically to determine those shedding cercariae, mice were exposed to infection and were killed and examined 60 days later.

The experiments are described in two groups—those that resulted in successful infection and those that failed to demonstrate susceptibility in the experimental snails. [The experiments could also be grouped according to the genus investigated, *viz.*, all species of *Biomphalaria* proved susceptible and all species of *Bulinus* non-susceptible.] The results of experimental exposure of *Biomphalaria* spp. to *S. mansoni* are tabulated as follows:

	No. snails exposed	No. infected	Infection %
<i>Biomphalaria smithi</i>	100	81	81
<i>B. stanleyi</i>	130	112	86
<i>B. elegans</i>	80	12	15
<i>B. pfeifferi</i> subsp. ?	100	98	98
<i>B. adowensis nairobiensis</i>	100	86	86

“ Wild ” snails of the species *B. stanleyi*, *B. pfeifferi* and *B. adowensis nairobiensis* were found shedding furcocercous cercariae. Mice exposed to infection produced lateral-spined ova in the faeces or such ova were found in the wall of the intestine 60 days later.

Four species and subspecies of *Bulinus* were investigated in identical manner as were the species of *Biomphalaria*. All proved non-susceptible to infection with *S. haematobium*. These species were: *B. tropicus tropicus*, *B. tropicus mutandaensis*, *B. tropicus alluaudi* and *B. coulboisi*.

With inclusion of the results of the earlier series of experiments referred to above, the author concludes that all the 10 species and subspecies of *Biomphalaria* known in East Africa are [potential] vectors of *S. mansoni*. Also, of the species of *Bulinus* known in Uganda the only species incriminated as potential vectors are *Bulinus (Physopsis) nasutus* and *Bulinus (Physopsis) globosus globosus*.

O. D. Standen

SCHWETZ, J. **The Effect of Climatic Variations on Pulmonate Gastropoda, compared with that of Molluscicides.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Nov., v. 50, No. 6, 579–82, 1 map.

The author contributes a vivid and interesting account of the effect of the drying up of two swamp areas—one in the Lango District, Uganda, and the other bordering Lake Tanganyika—on the molluscan hosts (*Planorbis tanganicus* [*Biomphalaria sudanica* var. *tanganicana*] and *Bulinus (Physopsis) nasutus* in the first instance and *Pl. tanganicus* in the second) of schistosomiasis.

In both areas the drying up of the swamps led to an apparent disappearance of the snails. “ But on digging, we found under the dry crust of the soil, moist earth, containing here and there an entire snail, ‘ hibernating ’, waiting for the rains to awaken it in order to restock the swamp.”

The author is of the opinion that "while we must pursue our search for new molluscicides, we must not neglect, at least not at present, all other means of combating schistosomiasis according to local conditions: drying, drainage, general measures of hygiene and above all the treatment of patients, carriers of schistosomes".

R. M. Gordon

MAGALHÃES NETO, B. & DE ALMEIDA, A. M. Equipamento enzimático do aparelho digestivo de *Australorbis glabratus*. III—Lipase da glândula digestiva. [**Enzymes of the Digestive Tract of *Australorbis glabratus*. III. The Lipase of the Digestive Gland**] *Publicações Avuls. Inst. Aggeu Magalhães*. Recife, Brazil. 1955, v. 4, 73-7, 2 graphs. [10 refs.]

The English summary appended to the paper is as follows:—

"The authors verified the presence of a lipase in the digestive gland of *Australorbis glabratus* which has an excellent action at pH 5.6."

MAGALHÃES NETO, B. & DE MORAES, J. G. Estudo da regulação osmótica em *Australorbis glabratus*. I—Aumento do teor de cloretos do sangue em função da salinidade do meio. [**Study of Osmotic Regulation in *Australorbis glabratus*. I. Increase in Blood Levels of Chlorides as a Function of the Salinity of the Medium**] *Publicações Avuls. Inst. Aggeu Magalhães*. Recife, Brazil. 1955, v. 4, 117-24, 2 graphs.

The English summary appended to the paper is as follows:—

"The authors studied the behavior of *Australorbis glabratus* toward changes of osmotic pressure in the environment.

"Two groups of experiments were made using snails from different habitats. The results showed that in both groups the animals present the same behavior toward changes of osmotic pressure in sodium chloride solution or sea water dilutions and a certain grade of euryhalinity."

DESCHIEENS, R. & BIJAN, H. Comportement d'élevages de mollusques vecteurs des bilharzioses à l'obscurité. [**Developmental Behaviour of Snail Vectors of Schistosomiasis in the Dark**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 658-61.

10 specimens of *Planorbis* [*Australorbis*] *glabratus* were placed in each of 2 aquaria provided with *Elodea canadensis* [Canadian water-weed] and lettuce leaves. An equal number of *Bulinus contortus* were placed in two similar aquaria. All aquaria were artificially aerated and maintained at 20-24°C. For each species one aquarium was covered in black material and the other exposed to daylight. Mortality rate, behaviour, egg-laying and development of the young were followed during the course of 90 days' observation.

P. glabratus in the darkened aquarium maintained their normal activity and egg-laying equally with those in the illuminated aquarium. Almost all the eggs hatched in the dark and development of the young was equal under both conditions. At the end of 90 days the snails in the darkened aquarium had increased from 10 to 90 while in the control the increase was from 10 to 96.

B. contortus did not thrive well under darkened conditions. By the 30th day 4 out of 10 snails had died. The remaining 6 snails produced few egg masses and these contained only a small number of eggs, many of which failed to develop or developed only slowly. By the 90th day the darkened tank contained 6 adults and 2 young while the illuminated control tank contained the original 10 adults and 41 young.

The *Elodca* died in the darkened tanks and no microscopic algae developed. The authors conclude that illumination is necessary for the development of *B. contortus*; that such illumination provides the necessary algal growth for nourishment of the young and that the occasional stimulus of light may be necessary for tissue development and activity of endocrine and sex glands. It is believed that the experimental findings are directly related to the ecological distribution of the two species in nature and that *P. glabratus* is much more readily adaptable to dark conditions because it is frequently found in shaded habitats.

O. D. Standen

COUTINHO, J. O. Nota sobre a infestação experimental do *Australorbis nigricans* (SPIX) do Município de São Paulo, pelo *Schistosoma mansoni*. [**Experimental Infection of *Australorbis nigricans* with *Schistosoma mansoni* in São Paulo, Brazil**] *Arquivos Facul. de Hig. e Saúde Pública Univ. de São Paulo*. 1956, June-Dec., v. 10, Nos. 1/2, 61-4.

The English summary appended to the paper is as follows:—

“An attempt was made to infect *Australorbis glabratus* and *Australorbis nigricans* with *Schistosoma mansoni*.

“The experiments were not successful when using snails brought directly from endemic areas: *A. nigricans* from Santos (São Paulo) and *A. glabratus* from Recife (Pernambuco) and Jacarèzinho (Paraná).

“The complete cycle of the trematode in snails, to the stage of cercariae, was observed in experiments with specimens bred in the laboratory: *A. glabratus* from Recife (Pernambuco) and *A. nigricans* from the City of São Paulo.

“The author is of the opinion that there is no transmission of *Schistosoma mansoni* in the City of São Paulo and vicinities due to the following facts: *A. nigricans* has little susceptibility to the infection, the climatic conditions are not favorable to the evolution of the parasite in the intermediate host and the density of that snail is low in the area.”

FERGUSON, F. F. & GERHARDT, C. E. **Sexual Apparatus of Selected Planorbid Snails of the Caribbean Area of Interest in Schistosomiasis Control.** *Bol. Oficina Sanitaria Panamericana.* 1956, Oct., v. 41, No. 4, 336-45, 22 figs.

"1. Species of *Drepanotrema* may be easily differentiated from *Australorbis* by dissection of the hermaphroditic sexual apparatus, by shell characteristics and by knowledge of the required habitat.

"2. Cardinal diagnostic features of the reproductive system of *Drepanotrema* include a flagellum which is shorter than the rest of the penis complex, and which has either a double branch or single origin at the apex of the vergic sac.

"3. Nonhuman schistosome cercariae found in some *Drepanotrema* may account for dermatitis induced by contact with certain waters.

"4. *Helisoma duryi eudiscus* may be grossly differentiated from *A. glabratus* by shell characters, of which the extremely deep lateral concavity and the prominently flared major opening are noteworthy.

"5. *Helisoma* may be definitely differentiated from *Australorbis* through dissection of the sexual apparatus. Two primary characters are of diagnostic value; the very large bulbous penial complex equipped with an internal penis gland and a prominent external duct of the latter gland, and the fan-wise arrangement of the diverticula of both the prostate gland and ovotestis, when viewed in cross-section."

COELHO, R. de B. *Patologia da esquistossomose mansônica 1—Comportamento patogênico do ovo do Schistosoma mansoni.* [**Pathology of Schistosoma mansoni Infection. I. Pathogenic Behaviour of the Eggs of S. mansoni**] *Publicações Avuls. Inst. Aggeu Magalhães.* Recife, Brazil. 1955, v. 4, 61-71. [18 refs.] English summary.

This is the first of a series of papers on the pathology of *S. mansoni* infection and the various aspects of the study are set out in the introduction.

The author then gives a critical review of the subject with reference to his own work and that of others [see, for example, this *Bulletin*, 1942, v. 39, 563; 1952, v. 49, 880; 1954, v. 51, 287; 1956, v. 53, 1250]. The relative importance of the eggs in pathogenesis is pointed out and their dissemination is discussed together with the histopathology of the periovarian lesions; these last have been studied at various stages and correlated with the life of the miracidium.

The lesions produced by the eggs are primarily endovascular; the reactions to the substances liberated by the miracidia are divided into 3 stages, namely (1) local tissue necrosis with exudative inflammation; at this stage the miracidia are still alive, (2) periovarian reaction by histiocytes; the miracidia are now dead, and (3) giant-cell formation, fibrous regression, formation of collagenous nodule, recanalization: the reactional

tissue disappears and the functional reintegration of the vessel is wholly or partly restored.

The suggestion is made that the histiocyte proliferation is evidence of an antigen-antibody reaction.

H. J. O'D. Burke-Gaffney

RODRIGUEZ-MOLINA, R., OLIVER-GONZALEZ, J. & SERRANO, Diana G.
Studies on Immunity to Schistosomiasis mansoni: Evaluation of the Circumoval Precipitin Tests as a Diagnostic Procedure in Clinical Schistosomiasis mansoni. Report of 46 Cases. *Bol. Asoc. Med. de Puerto Rico.* 1956, Oct., v. 48, No. 10, 389-92.

"1. The circumoval precipitin test was employed as a diagnostic procedure in clinical schistosomiasis mansoni. The present report is a preliminary study on the reliability of this procedure in the diagnosis of schistosomiasis mansoni.

"2. The test was carried out in 46 documented cases of *S. mansoni*. Living or dead ova were observed in all cases either in the stools or in tissue removed from a rectal valve or in both at the time the precipitin reaction was performed.

"3. The circumoval reaction was found to be positive in 43 out of 46 individuals with an incidence of 93%."

[See this *Bulletin*, 1955, v. 52, 985; 1956, v. 53, 1353.]

SPINGARN, C. L., EDELMAN, M. H., GOLD, T., YARNIS, H. & TURELL, R.
Value of Rectal Biopsies in the Diagnosis and Treatment of Schistosoma mansoni Infections. *New England J. of Med.* 1957, Feb. 14, v. 256, No. 7, 290-94, 5 figs. [20 refs.]

Schistosoma mansoni infections are prevalent in Puerto Ricans who have emigrated to New York. These have provided the material for this investigation. After a brief review of the literature on the diagnosis of the various schistosomiasis of man by rectal biopsy, and description of their work, the authors conclude with the following summary.

"The relative value of the examination of stools and rectal biopsies in the diagnosis of infection with *Schistosoma mansoni* was determined in 106 Puerto Ricans with this disease.

"*Schistosoma* ova were found in 93 per cent by the microscopical examination of biopsied fragments of rectal mucosa, in contrast to 83 per cent by the examination of stool specimens. The study of a biopsy required less time than that of a stool and allowed for the rapid and easy determination of the viability and the different stages of the maturity of the ova.

"The numbers of ova found in 74 rectal biopsies varied from 1 to 400. The majority of these specimens contained fewer than 50 ova.

"In patients whose rectal biopsies contained viable ova, they were also readily found in the stools. In cases in which the stools did not contain ova, small numbers of dead ova were usually found in the biopsy, and viable ova were seen infrequently.

"Ova were found in the stools of 7 patients whose rectal biopsies were negative.

"Treatment with Fuadin resulted in an increase in the number of dead ova and a decrease in the number of viable ova seen in rectal biopsies. This suggested that the drug had a lethal action on ova.

"The presence of only dead ova in a biopsy obtained after treatment was not reliable evidence of the cure of schistosomiasis since viable ova might still be found in stool examination.

"The rectal mucous membrane appeared normal in 94 per cent of the cases. There was no correlation between the appearance of the mucosa and the numbers or types of ova seen on rectal biopsy."

A. R. D. Adams

RODRIGUEZ, H. F. **Schistosomal Hepatosplenomegaly.** *Bol. Asoc. Med. de Puerto Rico.* 1956, Oct., v. 48, No. 10, 393-403, 3 figs. [11 refs.]

The role of *Schistosoma mansoni* in producing liver changes is problematic; conflicting views on it have been published [see this *Bulletin*, 1957, v. 54, 196].

The author, in Puerto Rico, has studied 110 patients of both sexes with liver cirrhosis. He sets out his findings in a number of tables. 60 (54.5%) of the patients were chronic alcoholics; 12 of these also had schistosomiasis and so were excluded from the evaluation. 5 others had such diseases as viral hepatitis or disease of the biliary system; these also were excluded. This leaves 60 cases of portal cirrhosis, and 33 cases of schistosomal cirrhosis. The average age of the former patients was 50.9 years, that of the latter 23.8 years; 22 of the former were females and 38 males, and 11 of the latter females and 22 males.

Portal hypertension and oesophageal varices were an outstanding complication in the schistosomal cases; fluid accumulation, jaundice and evidence of endocrine disturbance—frequent in the non-schistosomal groups—were prominently absent. Liver enlargement was common to both groups; spleen enlargement occurred in 87.9% of the schistosomal cases but in only 35% of those with portal cirrhosis. The spleen enlargement in the schistosomal cases was not associated with any specific lesion; ova are found very rarely in the spleen. Hypersplenism, and its consequences, is a frequent sequel of this splenic enlargement. Liver function tests gave the expected high proportion of abnormal findings indicative of hepatic insufficiency in the portal cirrhosis group; they showed only moderate impairment in the schistosomal cases, and indeed 13 (40%) of the 32 schistosomal patients so tested gave no abnormal tests.

Splenic venography [see also *ibid.*, 1955, v. 52, 658] was of value in establishing the presence of an intrahepatic block in the portal circulation of those patients with unimpaired liver function. Oesophagoscopy proved better than splenoportography, and both were superior to oesophagograms in demonstrating the presence of oesophageal varices; a combination of the 3 procedures gave very valuable results. The treatment of patients with schistosomal cirrhosis lies in the skilful performance of vascular shunt operations; the risks are lower in these patients than in corresponding patients with cirrhosis of alcoholic or nutritional origin by virtue of the better liver function and the lower age of those involved.

A. R. D. Adams

MARTINEZ-RIVERA, E. & KOPPISCH, E. Las manifestaciones pulmonares de la esquistosomiasis de Manson en Puerto Rico. [**Pulmonary Manifestations of *Schistosoma mansoni* Infection in Puerto Rico**] *Bol. Asoc. Med. de Puerto Rico*. 1956, Oct., v. 48, No. 10, 404-22, 11 figs. [31 refs.]

The authors, from Puerto Rico, describe the results of 1,520 autopsies performed between 1926 and 1950. The patients were aged 6 to 70 years. In 248, schistosomiasis was present (16.3%) as judged by the presence of eggs of *S. mansoni* and pseudotubercles seen microscopically. The greatest incidence (33.4%) was at ages 21 to 30 years and there were 4 times as many males as females. In 161 (64.9%) of these 248 cases pulmonary lesions were present. In all but 3 the lesions were minimal: the 3 severe cases and the histopathological changes found are reported in detail and illustrated with photomicrographs. Of all the 248 cases of schistosomiasis only 17 were severe (6.9%) and the cases with severe pulmonary lesions were only 1.2%. One of the authors, in Puerto Rico, had previously noted a relationship between the severity of the disease and the incidence of pulmonary lesions [this *Bulletin*, 1942, v. 39, 563].

The nature and development of these pulmonary lesions are discussed with reference to the literature [see also *ibid.*, 1956, v. 53, 1134].

H. J. O'D. Burke-Gaffney

MAGALHÃES NETO, B. & DE MORAES, J. G. Avaliação da atividade moluscocida em laboratório. [**Laboratory Evaluation of Molluscicidal Activity**] *Publicações Avuls. Inst. Aggeu Magalhães*. Recife, Brazil. 1955, v. 4, 39-50, 5 graphs.

The English summary appended to the paper is as follows:—

“The authors studied the molluscicidal activity of sodium pentachlorophenate and copper sulphate against the snails *Australorbis glabratus* and *Tropicorbis centimetralis* in accordance with the concept of ‘lethal contact time’ described by Szumlewicz & Kemp. Copper sulphate proved to have

much more rapid effect than sodium pentachlorophenate when tested against both species."

[See this *Bulletin*, 1952, v. 49, 1057.]

PELLEGRINO, J. & BRENER, Z. **Method for isolating Schistosome Granulomas from Mouse Liver.** [Research Notes.] *J. Parasitology*. 1956, Dec., v. 42, No. 6, 564, 1 fig.

When mice are infected experimentally with *Schistosoma mansoni* an intense cellular reaction occurs around the eggs in the liver and granulomas form: in experimental screening of drugs the granulomas on the liver surface are counted, and the authors, from Brazil, describe a rapid and simple way of isolating such schistosome granulomas from the livers of infected mice.

The liver on removal is washed in tap water and cut into small pieces: the adherent diaphragm, ligaments, veins and biliary ducts are removed during the cutting. These pieces of liver in 150 ml. saline are homogenized for 3 minutes in a Waring blender. The material is then poured into cylindrical glasses for sedimentation of the granulomas, which may be observed easily as small granules. They are then washed by repeated sedimentation and stored in 10% formalin for counting, which is done by direct counts in Petri dishes. A photograph (natural size) shows clearly numerous granulomas isolated from the liver of a mouse 8 weeks after infection with *S. mansoni*.

H. J. O'D. Burke-Gaffney

COELHO, B. & COUTINHO, E. M. Histopatologia da infestação natural e experimental do timbu ou gambá (*Didelphis paraguayensis paraguayensis*), por *Schistosoma mansoni*. [**Histopathology of Natural and Experimental Infections of the Opossum *Didelphis paraguayensis paraguayensis* with *Schistosoma mansoni***] *Publicações Avuls. Inst. Aggeu Magalhães*. Recife, Brazil. 1955, v. 4, 1-37, 13 figs.

The English summary appended to the paper is as follows:—

"Histopathological studies were made of the organs of the opossum (*Didelphis paraguayensis paraguayensis*) infected with *Schistosoma mansoni*. This common opossum is easily infected under laboratory conditions and animals with heavy natural infections were found frequently.

"The main lesions were found in the liver, lungs, pancreas and the intestine. However, slight involvement of other organs was also observed.

"Many eggs with active *miracidia* were found in the mucosa of the large intestine on their way into the lumen.

"In most instances the lesions in the organs were caused by eggs which produced a granulomatous inflammatory reaction complicated by

central necrosis. Lesions in the fibro-collagenous stage infections indicate that relatively rapid involution of these lesions occurred.

"Many living worms, often paired males and females, were found in the vessels of the intestinal submucosa as well as in the serosa and in the mesenteric veins.

"The absence of dead worms in all of the organs examined may have been due to the short period of infection before the animals were sacrificed."

P'AN, Ju-Sun, HUANG, Ming-Hsin, CHIANG, Shao-Chi, LU, Cheng-Wei, Hsü, Chia-Yü & Hsü, Chi-Min. **Rectosigmoidoscopy in Schistosomiasis japonica.** *Chinese Med. J. Peking.* 1957, Jan., v. 75, No. 1, 28-40, 12 coloured figs. on 2 pls.

The authors have examined sigmoidoscopically 125 patients with *Schistosoma japonicum* infections of varying degree. There were 117 male and 8 female patients, ranging in age from 15 to 54 years. 62 were suffering from acute disease of mild or moderate severity; 13 had recently recovered from an acute attack; and 50 were in a chronic state of the disease. The first two groups consisted of people infected in 1955 and the last group of farmers from endemic areas. All the patients on examination yielded viable eggs of the worms.

The sigmoidoscopic examinations were done in the Sims lateral position 2-3 hours after a cleansing saline enema; 2% procaine jelly was used as the lubricant. The characteristic lesions were chiefly seen between the second rectal valve and the recto-sigmoid junction—about 10 to 15 cm. from the anus; only 10% showed these lesions in the sigmoid. They were found commonly on the dorsal wall of the bowel rather than on the ventral.

In the acute stage the main features were mucosal oedema and congestion; the presence of yellow spots and nodules was characteristic. Four degrees of mucosal congestion and oedema could be distinguished; the last of these was so pronounced as sometimes to prevent the introduction of the instrument, but this grade of severity was met with in only one case. Ova could usually be recovered from the yellow spots and nodules. Polyps, haemorrhagic spots and patches, vesicles, and pits were seen in some of the acute cases. A thin bloody mucous discharge was usual in these.

In the post-acute-stage patients, oedema, sandy granular patches, polyps, haemorrhagic spots, red and yellow nodules, submucosal masses, and shallow ulcers were found. The oedema in these was less frequent and less severe than in the acute-stage patients.

In the chronic-stage patients the mucosa was not oedematous, but it was hypertrophied and thickened. Scars were common, and the surface vascular network was distorted or invisible. Multiple brownish discrete

depressions, and clusters of grape-like granulomas, were the outstanding features of this chronic stage; these lay especially over the proximal part of the rectum. The authors refer to the depressions as "pock marks". Solitary polyps were also common in this stage. The scarring, polypoid growths and grape-like granulomas frequently cause marked narrowing of the bowel in the rectal and sigmoid regions; even complete obstruction may result from them.

Repeated re-examinations with the sigmoidoscope, the clinical picture, and post-mortem studies have thrown light on the development of the disease process. In the acute stage the intestinal changes appear early, usually in the rectum. Apparently the cercariae after entering the body settle in the liver for a period of primary growth, and then migrate directly down the inferior mesenteric vessels for maturation and oviposition. The older view that the parasites migrate from the liver into the superior mesenteric vessels, and primarily involve the small intestine and then the colon, needs reconsideration. The rectosigmoid mucosa is involved initially in an allergic reaction dependent on the location and number of lesions in the mucosa and submucosa. After antimony treatment the oedema and congestion subside; the mucosa becomes granular and sand-like. Some masses, previously masked by the oedema, now appear; segmented engorged surface vessels show local circulatory disturbances following vascular obstruction and residual inflammatory processes. In the chronic stage repair, which always goes on when there is tissue destruction, overshadows the latter; fibrosis and scar formation therefore predominate, and this causes local vascular disturbances. Proliferation of tissue causes polypoid outgrowths. "Pock marks" are the result of rupture and healing of abscesses. The occurrence of the specific lesions in the rectum rather than in the sigmoid requires explanation; the dorsal rather than the ventral location of the lesions conforms with the ramifications of the inferior mesenteric vein and the position of the mesentery.

In some chronic cases repeated stool examinations yield no ova; here sigmoidoscopy is often diagnostically decisive. In schistosomiasis the ulcers are shallow and irregular, and they vary in size; the intervening mucosa is hypertrophic and cicatrized. They differ from those in amoebic dysentery in that the ulcers in the latter are often deep, with undermined edges, and they are surrounded by normal mucosa. By contrast, in bacillary dysentery they are shallow and diffuse, and the mucosa is inflamed and oedematous.

Recto-sigmoidoscopy is of great value in schistosomiasis for diagnosis, for detecting inadequately treated infections, for determining the stage of the disease, and as a guide to the need for collateral treatment where extensive secondary bacterial infection of the bowel lesion is evident.

[This excellent paper is well illustrated by coloured drawings of the various lesions. It should be studied in the original by those dealing with the disease.]

A. R. D. Adams

Bulletin, 1955, v. 52, 1208] from *Echinococcus cysticus* [*granulosus*]. The former has been found only in a few fairly circumscribed areas in Württemberg, Bavaria, the Tyrol, northern Switzerland, Russia and Siberia. In the tapeworm stage it is found mainly in the fox but sometimes in dogs and cats. Field mice have been shown to carry the larval stage. The development of the cysts is slow and takes about 5 months from egg to a cyst of 1.0 cm. in diameter which then may increase considerably in size. Cysts occur chiefly in the liver (in 74.9% of cases) and with lessening frequency in the lungs, muscles, spleen, kidney, brain and bones. Clinically the human infection differs from that of *E. cysticus* in that large cysts causing pressure effects do not occur but the cystic process infiltrates the host tissues, almost like a malignant tumour, with the formation of numerous, minute cysts about 1.0 mm. in size.

A detailed account is given of the case of a man aged 27, admitted to hospital in June 1953 with jaundice. His symptoms, signs and the laboratory findings led to the presumptive diagnosis of epidemic hepatitis. He was discharged in December 1953 as he appeared to be cured. In June 1954 there was a recurrence of jaundice and fever for which he was readmitted and investigation led to the diagnosis of post-hepatitis cholangitis. Again he recovered, was discharged in September and again relapsed in December 1954. It was decided to operate and a laparotomy showed gross involvement of the left lobe of the liver with numerous small and minute cysts. After the operation the condition of the patient deteriorated and there was considerable impairment of liver function. In February, it was decided to give injections of thymol as thymol in oil has been shown to be of value in *E. cysticus* infection. Accordingly 1.0 cc. of palmitic acid thymol ester (equivalent to 0.37 gm. thymol) was injected intramuscularly every second day on 5 occasions. After a pause of 6-14 days the course of 5 injections was repeated. A total of 5 courses of injections was given. The patient, however, got worse, developed septic parotitis and dry pleurisy and appeared to be moribund. Nevertheless he began to improve 3 months later and in July 1955 was well enough to be discharged. When examined in October 1956 the general condition of the patient was very good, the liver was no longer enlarged and hepatic function tests were normal. M. E. Delafield

PETRONE, P. L'anchilostomiasi in provincia di Potenza e sua infestazione a carattere endemico-epidemico nel Comune di Senise. [**Ankylostomiasis in Senise**] *Giorn. di Malattie Infettive e Parassit.* 1957, Feb., v. 9, No. 2, 71-5, 5 figs. [12 refs.]

This is almost a text-book description of how ankylostome infection can occur and flourish. The commune of Senise in S.W. Lucania has a population of about 7,000. The main industry is agriculture, human faeces are often used as manure, and the workers go barefoot. It is surprising therefore that up till 1946 cases had not been reported. The

disease then became endemic and an explosive outbreak occurred in the spring and early summer of 1956, 310 cases being detected by faecal examination.

A number of laboratory tests were carried out on some of the patients, and also electrocardiograph (ECG) tests on 16 selected patients because they were the most anaemic among those receiving treatment. ECG alterations were found in 5 [but it is by no means clear that the ECG changes were directly related to the ankylostome infection].

The preventive measures recommended follow the usual lines, and include treating the ground with calcium cyanamide.

W. K. Dunscombe

KIKUCHI, H. [Studies on the Differentiation between Eggs of *Trichostrongylus orientalis* and those of *Ancylostoma duodenale* by means of Culture] *Hirosaki Med. J.* 1956, Mar. 30, v. 7, No. 1, 79-82. [22 refs.] [In Japanese.] English summary *14.

To differentiate between the eggs of *Trichostrongylus orientalis* and those of *Ancylostoma duodenale*, which closely resemble each other, the authors compared percentage survival of the eggs when they were cultured at low temperature.

The results may be tabulated thus:—

Kept at	Cultured	Average % Survival	
		<i>T. orientalis</i>	<i>A. duodenale</i>
7°C. for 3 days	10°C. to 15°C. for 2 weeks	82.1	28.6
0°C. for 2 days	27°C. for 7 days	89.6	1.4
-5°C. for 2 days	27°C. for 7 days	89.1	0

It is suggested that differentiation may thus be made by adjusting the conditions of culture so that only *T. orientalis* eggs survive.

H. J. O'D. Burke-Gaffney

BABA, T., NAGATA, K. & AIZAWA, T. On the Anthelmintic upon Serum Protein in Ancylostomiasis. *Gunma J. Med. Sci.* Maebashi. 1956, Dec., v. 5, No. 4, 281-8, 1 fig. [25 refs.]

"1. Sera from 20 ancylostomiastic men and women were analysed by the paper electrophoretic method to obtain serum protein pictures, and these and hemograms and urinary urobilinogen values obtained before and after treatment were compared.

"2. Before treatment, there was the decreases of Al [albumin] and γ -gl [globulin], and the increase of α_1 -gl, α_2 -gl, β -gl and urinary urobilinogen, which were not always in agreement with the rate of anemia, indicating not only hemorrhage but also the occurrence of functional disturbance of the liver due to the worm toxin. Subsequently, correlation between each serum fraction and the disturbance of protein and lipid metabolism by the liver was investigated.

"3. In some cases, after treatment, with tetrachlorethylene Al was

further decreased and α -gl, β -gl and urinary urobilinogen further increased. All these are considered to be due to the temporary increase of hepatic functional disturbance due to the anthelmintic.

"4. The features of the hemogram were hypochrome anemia and the increase of eosinophil cells. Since iron preparation was not administered in the present experiments, the recovery of the serum protein fractions except β -gl preceded that of the hemogram."

BEAVER, P. C. **Larva Migrans.** *Exper. Parasit.* New York. 1956, Nov., v. 5, No. 6, 587-621, 1 fig. [Numerous refs.]

The literature concerning *larva migrans* is extensive and scattered through a wide variety of zoological, helminthological, veterinary and medical journals, so that although the author of the present paper quotes more than 130 references, these by no means cover the entire subject, for, as he is careful to point out, he has not considered those cases in which the responsible parasite has been an insect, a pentastomid, a tape-worm or a fluke; and has confined his review to those cases in which the *larva migrans* has been a nematode. In such instances the nematode larva never reaches maturity within a normal period of prepatency in the uncongenial host, and Dr. Beaver suggests that such infections might be referred to collectively as "*nonpatent nematodiasoses*". The classic example is "creeping eruption" caused by hookworm larvae but "There are numerous variations of this and related conditions, involving species of nematode larvae that enter the body *via* the oral route as well as by skin penetration. In these diverse conditions, man's relationship to the parasite may be that of an intermediate host, an abnormal final host or a normal final host whose immune state or some other condition renders his relationship to the parasite similar to that of an abnormal host".

It is to be hoped that this admirable summarization of our knowledge of nematode parasites in the role of *larva migrans* will be brought to completion by reviews of the remaining helminths (trematodes and cestodes) and arthropods (insects and pentasomids) which, on occasions, play a similar part.

R. M. Gordon

HARRIS, J. E. & CROFTON, H. D. **Structure and Function in the Nematodes: Internal Pressure and Cuticular Structure in *Ascaris*.** *J. Exper. Biol.* 1957, Mar., v. 34, No. 1, 116-30, 5 figs. [15 refs.]

NISHIMURA, K. [**Experimental Culture of *Ascaris lumbricoides* in the Bile extracted from the Human Body**] *Hirosaki Med. J.* 1956, Mar. 30, v. 7, No. 1, 155-7. [14 refs.] [In Japanese.] English summary *28.

Ascaris lumbricoides was kept in human bile, in saline and in 5% glucose solution, all of which were renewed daily.

The worms survived for 15 days in the bile, 13 in the saline and 15 in the glucose solution. H. J. O'D. Burke-Gaffney

NISHIMURA, K. [The Statistical Study on the 81 Cases of the *Ascaris* Invasion into the Bile Duct] *Hirosaki Med. J.* 1956, June 30, v. 7, No. 2, 250-65, 2 figs. [51 refs.] [In Japanese.] English summary *51.

The author, from Hirosaki University, Japan, studied 81 cases of *Ascaris* invasion of the bile duct, seen in a surgical clinic during a period of 10 years. The patients were mostly middle-aged, with a slight preponderance of females. The initial symptom was epigastric colic, usually radiating to the back, and often accompanied by violent vomiting of ascarids. Fever did not occur in the absence of complications and jaundice was rare and slight.

Despite the severe pain, physical signs were few. The abdomen was soft and flat, and the characteristic pain was localized to a point a few fingers breadth below the xyphoid process. The leucocyte count was normal in 47% in the absence of complications: eosinophilia was seen in only 22%.

In one out of 8 cases gastric acidity was normal before operation and in the other 7 there was anacidity or hypoacidity. After operation, anacidity was found in half of the cases examined and hypoacidity in most of the remainder. Stools were negative for *Ascaris* eggs in 20%, despite frequent examination.

Contrary to previous reports [this *Bulletin*, 1954, v. 51, 958] living ascarids were found in 63 of the 81 cases; in 13, dead ascarids, with or without gallstones, were found [*ibid.*, 1956, v. 53, 465, 1363]. This difference is attributed to the fact that surgical treatment was carried out at an earlier stage of *Ascaris* invasion than was reported by others.

The worms were found in the common duct in 95% and in the gallbladder in 2 cases only. Invasion was usually by a single ascarid (78%). Female mature worms slightly predominated over males. The authors believe that the reason for the invasion of the bile duct is that the worm has an "instinctive" character of entering small apertures: their reverse posture *in situ* suggested that the ascarids "showed the possibility of returning to the intestinal canal".

The prolonged presence of the ascarids in the bile duct usually resulted in some disturbance of liver function and often in mild pancreatic dysfunction: 5 cases of acute pancreatitis were seen. Diagnosis was not difficult and 80% were diagnosed correctly before operation.

Liver abscess was the commonest complication seen. In most cases the bile duct was greatly dilated, but in half the patients the gallbladder was normal [see also *ibid.*, 1954, v. 51, 958].

Of 40 patients followed up for more than a year after operation, 24 reported recurrence of the colicky pain. Evidently a surgical operation

does not produce radical cure and the author suggests that it should be undertaken only when duodenal tubing or other symptomatic measures have failed.

[See also *ibid.*, 1957, v. 54, 323.]

H. J. O'D. Burke-Gaffney

ATSUMI, T., SATO, K., ABO, S. & NISHIMURA, K. [**Chronic Pancreatitis experimentally produced by *Ascaris* Eggs**] *Hirosaki Med. J.* 1956, Mar. 30, v. 7, No. 1, 1-11, 10 figs. & 1 chart. [36 refs.] [In Japanese.] English summary *1.

1.0 cc. of a saline suspension of *Ascaris* eggs was injected into the pancreas of dogs either (a) through the pancreatic duct from its orifice in the duodenum or (b) directly into the substance of the pancreas. Histological changes were studied for 2 days to 2 months. After (a) signs of acute (7 cases) and chronic (9) pancreatitis were seen around the *Ascaris* eggs in 16 or 19 cases. In (b) chronic pancreatitis was observed in all 4 cases studied.

In the early stages, leucocytic infiltration, oedema and abscesses were conspicuous, but no tubercle formation was seen. As the chronic stage developed, a chronic inflammatory reaction appeared, with eosinophil infiltration and the development of foreign body giant cells in about 10 days. The increase of connective tissue was related to the actual presence of eggs.

The eggs in the pancreatic tissue were oval, round or polymorphic and varied in size from normal to very small. No albuminoid membrane was seen. The authors do not consider that an *Ascaris* toxin or allergy were essential factors in the development of the pancreatitis.

H. J. O'D. Burke-Gaffney

ATSUMI, T. **Experimental Formation of Gallstones by means of Round-worm Eggs.** *Tohoku J. Exper. Med.* 1956, Oct. 25, v. 64, Nos. 3/4, 243-52, 8 figs. [16 refs.]

"As a link in the series of experimental studies concerning gallstone formation due to roundworm, the following experiments were conducted with dogs as subjects. *Ascaris* eggs were introduced into the gallbladder and the biliary ducts of [69] dogs, the consequent stasis induced in them by the application of various methods, and then the eggs were taken out by reoperation at stated intervals. Finally the eggs and the composition of bile were examined. The results obtained were as follows:

"1. Though no manipulation or restriction was applied to the feed of the dogs, precipitation of calcium bilirubinate on the ascaris eggs was observed on 20% of the total cases thus examined.

"2. In most of the experimental animals, infection by colibacillus was observed in the biliary tract, but the most important factor causing the

precipitation of calcium bilirubinate in these experiments was presumably the stasis of bile.

"3. Of the different conditions of the eggs, fertilized eggs were more frequently subject to precipitation of calcium bilirubinate than unfertilized eggs, and among the former, those with albuminoid membranes were most apt to receive precipitation on them.

"4. Of the different groups of the experimental animals, the group injected with calcium chloride solution in combination with the ascaris egg suspension and with their cystic ducts lightly ligated showed the highest frequency of precipitation.

"5. In general, in the early stage following the introduction of ascaris eggs, calcium bilirubinate is found to have precipitated in sporadic dots on the albuminoid membranes and the shells of the eggs, so that these and the egg cells are still clearly visible, but in 3 weeks, the precipitation will gain in scope and density, so that the structure of the eggs will be blurred. The time required for the initiation of the precipitation after the introduction of the eggs was 4-5 days in the gallbladder and 7-10 days in the biliary ducts, while it took 30 days for the first precipitation to occur in vitro.

"6. In some cases of fertilized but albuminoid membraneless eggs, calcium bilirubinate seemed first to seep into the egg cell before precipitation on the egg shell, and to grow thence toward the shell.

"7. From the above results of the experiments, I am led to the conclusion that, in ascariasis of the biliary tract, when ascaris eggs are laid or left in the biliary tract, a groundwork has already been laid for a rapid formation of pigment chalk stones in a very high probability."

[See also this *Bulletin*, 1956, v. 53, 1363.]

RIFAAT, M. A. & NAGATY, H. F. **Piperazine Treatment of Ascaris Infestation.** [Correspondence.] *Lancet*. 1956, July 21, 148.

A single dose of a piperazine salt has obvious advantages in the treatment of ascariasis. The authors, from Cairo, set out to find whether larger quantities than are usually given could ensure a radical cure when administered as a single dose.

They gave 6 gm. of piperazine adipate in tablet form to 35 adults weighing 40 to 80 kgm. who were infected with *Ascaris*. No preliminary preparation was done and no purgatives were given. Stools were re-examined 3 days after treatment and then every other day for 2 weeks. Negative stools at the last 4 examinations were taken to indicate a cure. In every case worms were expelled within 48 hours, but in 2 patients eggs were subsequently found in the stools: these were, however, few in number and were removed by treatment 10 days later. Thus 33 patients were completely cleared of *Ascaris* by a single treatment. The dose of 6 gm. was well tolerated, with no side-effects, immediate or delayed.

H. J. O'D. Burke-Gaffney

SOUTH PACIFIC COMMISSION. Nouméa, New Caledonia. **A Report on an Investigation on Filariasis in the Cook Islands** [IYENGAR, M. O. T.]. *Technical Information Circular No. 21*. 1957, Jan., 13 mimeographed pp.

Aedes polynesiensis is the vector of non-periodic *Wuchereria bancrofti* in the Cook Islands, infection rates in the mosquito being higher in and around houses than 100 yards away from them. Containers for water, broken coconut shells, and old tins are among the common breeding places. The usual data on the incidence of a filarial infection in a human community are tabulated and discussed. It is a major public health problem, filarial endemicity ranging from rates of 2.5% (at ages 1-4 years) to 62.4% (50 years and over). Gross manifestations of the disease occurred in 16.2% of 420 persons over 29 years of age.

Recommendations for control include piped water supplies and abolition of water containers, mosquito proofing of cisterns, banding coconut palms against rats (which damage the coconuts and thus provide breeding places for the mosquito), and intensification of antilarval measures (quartering of coconut shells and puncturing of tins, besides improved hygiene generally) in villages and for a peripheral area 120 yards wide.

D. S. Bertram

McFADZEAN, J. A. & HAWKING, F. **The Periodicity of Microfilariae. V. Stimuli affecting the Periodic Migration of the Microfilariae of *Wuchereria bancrofti* and of *Loa loa* in Man.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Nov., v. 50, No. 6, 543-62, 6 figs. [16 refs.]

The experiments with *Wuchereria bancrofti* were made at Fajara in Gambia, West Africa, and those with *Loa loa* and *Dipetalonema perstans* at Kumba in the British Cameroons. They were carried out with the cooperation of a number of volunteers, who were subjected for various periods of time to the following stimuli:— (1) increasing the concentration of oxygen; (2) decreasing the concentration of oxygen; (3) increasing the concentration of carbon dioxide; (4) decreasing the concentration of carbon dioxide; (5) the carrying out of various exercises; (6) the administration of sodium chloride so as temporarily to raise the level of the chlorides in the pulmonary capillaries. A much more limited number of experiments were carried out with other types of stimuli:— (7) subcutaneous injection of adrenaline (2 cases); (8) intramuscular injection of pituitrin (2 cases); (9) injection of insulin and cortisone (each in a single case); (10) injection of corticotrophin (2 cases); (11) administration of sodium lactate (1 case); (12) administration of an anaesthetic, Evipan (1 case); (13) raising the body temperature by applying heat externally for 1 hour (1 case).

In most instances an experiment which was carried out in the daytime was repeated under similar conditions at night and the results were

compared. The number of volunteers subjected to a particular stimulus, and the number of occasions on which any particular experiment was repeated, varied considerably. For these particulars, and for a full description of the techniques used and the methods employed for assessing the results, the original must be consulted.

The results recorded in this interesting and important paper show clearly that the behaviour of one species of microfilaria exposed to a particular stimulus differs widely from that of another species exposed to the same stimulus. Thus, in patients infected with *W. bancrofti*, the microfilarial count at night was rapidly diminished by the breathing of oxygen, by muscular exercise and by hyperventilation. On the other hand, in patients infected with *L. loa*, the count was not affected by any of the stimuli studied, apart from the administration of insulin or a general anaesthetic, while the microfilariae of *D. perstans* were not changed in number by any of the procedures employed.

As a result of these investigations and of those previously recorded, the authors postulate the following general conception of periodicity. "According to our conception, microfilarial periodicity depends upon a migration of the microfilariae between the peripheral circulation and the capillaries and small vessels of the lungs. There is a passive phase in which the microfilariae are fairly evenly distributed throughout all the blood, and hence they appear numerous in the peripheral circulation; and there is an active phase, in which the microfilariae are concentrated in the lungs. The purpose of the passive phase is to give an opportunity for the microfilariae to be sucked up by an insect vector, and it is timed accordingly (with microfilariae transmitted by nocturnal mosquitoes, it occurs at night; with *Loa*, which is transmitted by diurnal *Chrysops*, it occurs by day). The purpose of the active phase (of concentration in the lungs) is less clear, but we assume that the lungs are the optimum site in the body for the survival of the microfilariae. The distribution of microfilariae between lungs and periphery presumably depends upon a dynamic equilibrium rather than on a static one, the number in the lungs at any given moment being the difference between those arriving and those departing; the total may remain constant for appreciable periods, but the individuals probably keep changing. Judging by previous work (HAWKING and THURSTON, 1951) [this *Bulletin*, 1952, v. 49, 1141] there are always many microfilariae in the lungs even when the concentration in the peripheral blood is maximal. The concentration of the microfilariae in the lungs does not depend upon any opening or shutting of capillaries by the host (since *Loa* and *W. bancrofti* behave differently in the same host) but it must depend upon the microfilariae themselves giving an active response to some stimulus or stimuli provided by the 24-hour rhythm of the host. The nature of this active response, whereby the microfilaria holds itself in the capillary of the lung, is unknown; it might be a physical change of shape, e.g. a broadening and shortening, an electrostatic charge on the surface of the microfilaria, or something else

still unguessed. Against the hypothesis of an electrostatic charge it should be noted that the microfilariae of *D. repens* do not show orientation or migration in an electrophoretic cell (HAWKING, 1955)" [*ibid.*, 1955, v. 52, 1117].

[See also this *Bulletin*, 1957, v. 54, 592.] R. M. Gordon

BONNET, D. D. & CHAPMAN, H. **The Importance of Mosquito Breeding in Tree Holes with special reference to the Problem in Tahiti.** *Mosquito News*. 1956, Dec., v. 16, No. 4, 301-5. [12 refs.]

"A review of the problem of mosquito breeding in tree holes is presented with particular reference to the control of *Aedes polynesiensis*, the vector of filariasis in Tahiti. A survey showed that the most important species of tree was the bread-fruit (*Artocarpus incisa*) because of its abundance, proximity to dwellings, and the agricultural practice of 'topping' or pollarding, resulting in rot holes. A survey showed that there was an average of 1.7 rot holes per tree and that of these 29.6 percent contained larvae of *Aedes polynesiensis*. Methods for the elimination or control of mosquito breeding are discussed including chemical, filling and natural methods. A new method is presented which is cheap, simple and relatively permanent. A fern or similar plant is placed in the rot hole after partial filling with dirt or gravel. The growth of the fern roots the plant firmly in place, and water is withdrawn from the hole by transpiration. Preliminary trials of 9 months duration have shown this method to be effective in eliminating mosquito breeding."

BONNET, D. D., KESSEL, J. F., KERREST, J. & CHAPMAN, H. **Mosquito Collections and Dissections for evaluating Transmission of Filariasis in Polynesia (Tahiti).** *Amer. J. Trop. Med. & Hyg.* 1956, Nov., v. 5, No. 6, 1093-1102. [16 refs.]

The authors describe an "intensive survey method" with collecting teams of two persons, which they recommend as a possible standard procedure for collecting biting mosquitoes. Mosquitoes biting one member of the team acting as bait are collected for a period of 10 minutes at each collecting station. Each station is an area within 10 metres of each habitation within the district surveyed. At each station the best position for collecting is deliberately chosen and the team remains in position for 10 minutes irrespective of the abundance of biting mosquitoes. Collections are not made at a sequence of adjacent stations, but as randomly as possible. Usually the stations worked consecutively are at least 150 metres apart. A two-man collecting team is able to collect at 30-36 stations in one day.

In Tahiti all the mosquitoes collected are examined for the presence of filarial infection. In practice all the members of an "intensive survey" collect during the morning of a survey and two members of the team

dissect during the afternoon. This procedure is flexible, depending on the abundance of mosquitoes in the district. Two dissectors are able to dissect 250-275 mosquitoes a day. The procedure of collecting and dissecting is described in detail.

The type of information obtained is summarized in the following table taken from the original paper.

District	Human Population	Average no. of mosquitoes/minute	% Stations with no mosquitoes	% Stations with more than 1 mosquito/minute
Afaahiti	567	0.55	38.5	19.2
Faaone	439	0.65	29.4	26.6
Tiarei	302	0.77	18.9	33.4
Mahaena	182	1.13	34.1	28.5

The authors point out that the rate of capture of mosquitoes (mosquitoes per minute) does not completely represent the "transmission hazard" of a district. In some districts although the average rate of capture may be relatively low more human inhabitants may be exposed to the higher biting rates of 1 or more mosquitoes per minute. Efforts to combine the various indices have been only partially successful. Over the years 1953 to 1955 a general reduction has been observed in the rate of capture of mosquitoes (from 0.42 per minute to 0.20 per minute) and this is attributed to successful control measures.

The results from mosquito dissection have shown that the average number of larvae per dissected mosquito decreased markedly when the inhabitants of the district studied were treated with diethylcarbamazine. This has provided a check on the success of treatment with diethylcarbamazine and has proved less expensive and less laborious than blood surveys for microfilarial infections. The detailed mosquito surveys detected particular stations for infected mosquitoes and also detected that in some areas drug treatment was not being carried out efficiently. This was confirmed by microfilarial surveys. The mosquito dissections also provided opportunities for public education in the role played by the mosquito in filarial transmission and this generally made control work easier.

B. R. Laurence

JORDAN, P. **The Fevers of Africa. 5. Clinical Bancroftian Disease in Tanganyika.** *Central African J. of Med.* 1957, Jan., v. 3, No. 1, 18-23, 4 figs. [14 refs.]

In studies at Mwanza at the southern end of Lake Victoria the microfilaria rate in adult males was found to vary between 15 and 30%, and in a series of 1,500 admitted to hospital 10% had filarial disease.

Lymphadenitis may be acute or chronic and, on the whole, is less severe than in the Pacific. Gland puncture for microfilariae was performed in 22 persons with chronic filarial adenitis and all were negative, although 11 had microfilaraemia.

Scrotal elephantiasis is still fairly common in Tanganyika. Contrary to what is generally stated it can develop without hydrocele. In the vesicles of lymph scrotum microfilariae can be demonstrated. Hydrocele is considered to be the most important clinical manifestation of bancroftian infection owing to its prevalence and its effects upon reproductive capacity.

Chyluria was not encountered, but in two cases microfilariae, more abundant at night than in the daytime, were found in the urine. In both there was little evidence of filarial infection, apart from thickened spermatic cords and enlarged femoral glands in one. It is thought that their occurrence in this situation could be attributed to slight haemorrhages in the urinary tract as there was a trace of albumin and red cells in the urine.

Philip Manson-Bahr

HSIEH, H. C., TSENG, P. T. & CHUANG, C. H. **Larval Filariae found in *Anopheles* Mosquitoes in Southern Taiwan (Formosa).** *J. Formosan Med. Ass.* 1956, July, v. 55, No. 7, 320-24.

The authors record the finding of filarial larvae in 3 species of *Anopheles*. Out of 43,188 dissections the numbers infected were: *Anopheles hyrcanus sinensis* 42 out of 32,937; *A. tessellatus* 1 out of 6,598, and *A. minimus* 7 out of 3,653. No infections were found in *A. ludlowi* (1,719 dissected), *A. annularis* (30), *A. subpictus indefinitus* (12), *A. maculatus* (7), *A. splendidus* (6).

The morphological features of the filarial larvae are unlike those of *Wuchereria* and for definite specific identification further investigation is necessary.

H. S. Leeson

PATTANAYAK, S. & RAGHAVAN, N. G. S. **Microfilariae in Domestic Cats in India.** [Research Notes.] *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1956, Nov., v. 4, No. 6, 214-15.

Sheathed microfilariae, resembling those of *Wuchereria malayi*, were found in the blood of 2 out of 57 domestic cats examined in Sakhigopal area of Puri District, Orissa State, India. The prevalent filarial infection in the people locally is with *W. bancrofti* but there are also a few foci of *W. malayi*. The microfilariae from the cats have two prominent terminal nuclei and a prominent excretory pore. Their measurements (average of 10) are given as follows in microns:

Length		215.2
Breadth		8
Cephalic space	{ Length	10.5
	{ Breadth	7.4
Distance from anterior end to nerve ring		45
" " " " " excretory pore		62.5
" " " " " anal pore		178.6

[This is an important finding in view of the present known distribution of the *malayi* type of microfilariae in non-human hosts, viz., in Malaya and Kenya (this *Bulletin*, 1956, v. 53, 349; 1957, v. 54, 592); the recovery and identification of the adult worms will be looked forward to with interest. It is to be hoped also that it will further stimulate workers to search for such microfilariae in domestic cats and dogs in other countries, especially where human infection with *W. malayi* is known to occur, e.g., China and Indonesia, but also in regions where it is unknown.]

J. J. C. Buckley

DALIP SINGH. **Filarial Infection in Country Rabbits (*Lepus* sp.).** [Research Notes.] *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1956, Nov., v. 4, No. 6, 213.

JAMISON, D. G. & KERSHAW, W. E. **Studies on the Structure of the Skin in the Normal African and on the Changes associated with Infection with *Onchocerca volvulus*. II.—The Measurement of the Changes which accompany Ageing and Infection.** *Ann. Trop. Med. & Parasit.* 1956, Dec., v. 50, No. 4, 415–20, 5 figs.

A method of measuring the structure of the skin is described. When this technique is used multiple measurements are made of the thickness of the stratum corneum and of the distance between the stratum corneum and the shallow undulations of the germinal layer, the deep undulations of the germinal layer, and the dermis. When this information has been acquired, frequency-distribution histograms are constructed from all 4 measurements and the relations between the different dimensions can then be depicted diagrammatically. The authors consider that this technique when “used for the quantitative definition of the characteristic dimensions of the skin, their variations, and their relations to each other, replaces assessment by general impression. The graphic methods of expression show the changes clearly and in simple pattern; slight changes are thereby easily detected; and the extent of the changes can be so expressed that comparisons can be made and a means provided for measuring the progress of a physiological or parasitic process”.

The authors reach the following conclusions regarding the changes accompanying aging and accompanying infections with *Onchocerca volvulus* as observed in the skins of adult Africans:—(1) “*Changes accompanying ageing*. The principal changes which accompany ageing are shown in the epidermis; the stratum corneum and the thickness of the subepidermis remain unchanged. The epidermis becomes thinner and the depth of the papillary pegs is less marked. In consequence, the relations between epidermal measurements and the measurements of the other layers of the skin become more closely grouped.” (2) “*Changes associated with infection with O. volvulus*. The principal changes

associated with *O. volvulus* infection are shown in the thickness both of the papillary peg (III) and of the subepidermis (IV). In normal skin both these measurements increase more or less proportionately, their relation being expressed as an ellipse, with the long axis through the point of origin and at an angle of about 30°. In *O. volvulus* infections the thickness of the subepidermis is increased two or three times, and there is greater variation than in normal skin. The thickness of the papillary peg remains unchanged, and does not increase, either as regards individual pegs or as a group, with the increasing thickness of the subepidermis. The relation between the two measurements is therefore shown as a longer ellipse, with its long axis horizontal."

[This paper, like its predecessor (this *Bulletin*, 1956, v. 53, 90), contains much detailed information which does not lend itself to further summarization; it should be consulted in the original.] R. M. Gordon

DUKE, B. O. L. **The Reappearance, Rate of Increase and Distribution of the Microfilariae of *Onchocerca volvulus* following Treatment with Diethylcarbamazine.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Jan., v. 51, No. 1, 37-44.

"Ten African volunteers with onchocerciasis were submitted to examination by multiple skin snips to assess the distribution and concentration of microfilariae of *Onchocerca volvulus* in the skin. Each was then given a course of diethylcarbamazine (banocide) sufficient to destroy virtually all the microfilariae, and at intervals of from 3 to 13 months afterwards further examinations of multiple skin snips were made to assess the rate of increase in the numbers of microfilariae and their distribution in the skin."

After this course of treatment it was observed that the rise in concentration of microfilariae over the whole body during the first 13 months took place at a more or less steady rate in any given patient, although the rate of build-up varied from one to another. It was also observed that as the populations of microfilariae built up after treatment with diethylcarbamazine, so the pattern of their distribution was maintained, and the numbers tended to increase in all parts of the body in proportion to their pre-treatment concentration.

The appearance of microfilariae in the skin of the face and in the conjunctiva after treatment was observed, with one exception, only in those patients in whom the larvae had been present before treatment. The exception referred to was an African who before treatment showed no microfilariae in skin snips taken from the right outer canthus but who revealed microfilariae in this area after treatment.

The author's conclusions, which are quoted in full below appear to have an important practical bearing on the measures to be adopted for the chemotherapy and chemoprophylaxis of onchocerciasis.

"In the majority of the patients examined in the present series, the

mf. population density had reached somewhat more than half of the pre-treatment figure by the end of the 1st year after treatment, but in considering the empirical use of diethylcarbamazine as a means of reducing the mf. concentration in the individual and thereby preventing the development of anterior segment eye lesions, it seems advisable to take as a yardstick the two cases recorded here in which the most rapid mf. build-up was observed, and to assume that the original concentration in the body can be completely restored within a year of the cessation of treatment. It must also be remembered that in those persons whose eyes are already affected or threatened, and who show mf. in the skin of the upper parts of the body, in the skin of the face and in the eye, the mf. build-up may well commence immediately in the region of the eye and does not necessarily lag behind the build-up in the lower parts. In view of the possible rapid return of mf. to the region of the eye, it seems that to prevent the development of anterior segment lesions it would be unwise to allow an interval of more than 3 to 6 months (with an implied return of up to 25 per cent.—50 per cent. of the original mf. population) to elapse between courses of treatment. Even this interval might prove to be too long for safety in cases where the eye and face have already been heavily invaded before treatment commenced; or, for another reason, in subjects carrying a heavy overall load of mf., shorter intervals between treatments might be necessary in order to reduce the severity of the host's reaction to treatment, which in itself may be sufficiently unpleasant to cause the recipients to refuse further doses of the drug. The most practical measures among labour forces or other bodies which can be subjected to some degree of discipline, might well be to clear the skin of mf. by a heavy initial treatment, and then to continue to administer a daily or weekly dose of the drug in order to keep down the mf. population without the risk of unpleasant reactions."

R. M. Gordon

TAUFFLIEB, R. Rapport sur la campagne antisimulidienne de 1956 au Mayo-Kebbi. [**Report on the Control of *Simulium* in the Mayo Kebbi Region, French Equatorial Africa, in 1956**] *Bull. Inst. d'Études Centrafricaines*. 1956, No. 11, 53-9, 1 map.

The Mayo Kebbi and surrounding country in French Equatorial Africa received insecticidal treatment in 1955 in an effort to control *Simulium damnosum* [this *Bulletin*, 1956, v. 53, 473]. As a result of the finding of adults of this fly in July 1955, 2 months after the end of the rainy season, a thorough investigation was started. The enquiry is reported in detail in this paper.

It was decided to re-apply the same insecticide as on the previous occasion (a formulation of lindane) to the water at shorter intervals and at more places, taking care to protect the fish life. No air attack was to be made on the adult *Simulium* because of the expense.

During the preliminary survey larvae of *Simulium adersi* (of no medical interest) and *S. damnosum* were found. Adults of *S. damnosum* were also collected as well as a hymenopterous insect which the local inhabitants frequently mistook for *Simulium*. Altogether, the numbers were smaller when compared with pre-treatment figures.

Beginning in February 1956, 9 treatments were given at weekly intervals at 5 points of application along the river, the succeeding dosages at each point decreasing from 6 litres to 2.

At the time of writing (April 1956) it is too soon to report the effect of this second treatment.

H. S. Leeson

YAMAGUCHI, T., YAMAMOTO, Y., IJIMA, Y., SAKAMOTO, Y., IRIE, T., YANAGIHARA, T., MURAKAMI, K., HORIE, N. & TSUNO, K. [**Studies on *Gnathostoma* in Shikoku**] *Shikoku Acta Med.* 1956, Nov., v. 9, No. 5, 78-88, 1 text fig. & 21 figs. on 3 pls. [38 refs.] [In Japanese.] English summary.

Since 1953 the authors have studied the distribution of *Gnathostoma spingerum*, *G. nipponicum* and *G. doloresi* in Shikoku island, Japan.

In Kagawa and Tokushima Prefectures, several animals were collected and their muscle searched for third-stage larvae. 18 species have been identified as second intermediate hosts of *G. spingerum* and these included 3 species of fish, 2 amphibians, 2 reptiles and 11 birds. As final hosts, 5 of 39 cats and 2 of 39 dogs in Kagawa were found to be naturally infected with *G. spingerum* in their gastric walls.

The only final host of *G. nipponicum* so far determined was the Japanese weasel *Mustela sibirica itatsi*. Of 110 weasels examined in the two Prefectures and in Kochi Prefecture between 1953-56, only one was found infected, and that in the oesophageal wall.

G. doloresi was found in the gastric wall of 29 of 33 Japanese boars, *Sus scrofa leucomystax*, in Tokushima and Kochi. A salamander, *Hynobius naevius*, was identified as the second intermediate host in Shikoku. Larvae were found in the muscles of 2 of 28 *H. naevius* in Kochi Prefecture.

The first human case of gnathostomiasis in the island was found in Kagawa in 1953: the most important vector was a fresh water fish *Ophecephalus argus*. The predominant symptom is intermittent migrating swelling of the skin usually beginning on the trunk and moving to the face, head and extremities. Leucocytosis and eosinophilia are marked.

It is stated that an excellent means of clinical diagnosis is an intra-dermal test with an antigen prepared from the larvae (0.05 cc. of a 10-million-fold solution) or adult worms (0.05 cc. of a 50,000-fold solution), read in 15 minutes.

[See also this *Bulletin*, 1955, v. 52, 1004.]

H. J. O'D. Burke-Gaffney

COUTELEN, F., BIGUET, J., COCHET, G., DEBLOCK, S. & CAPRON, A.
Quelques considérations sur la réceptivité à l'oxyurose. A propos de
l'observation continue de quatorze enfants, poursuivie pendant sept
mois à l'aide de la méthode de Graham. [**Some Considerations on
Susceptibility to Enterobiasis arising from Observations on 14
Children made by Graham's Method during a Period of 7 Months**]
Bull. Soc. Path. Exot. 1956, July-Aug., v. 49, No. 4, 724-34.
[15 refs.]

The authors note there is general agreement that the incidence of enterobiasis in mixed communities is not uniform. In America Negro races show a lower degree of infection than Caucasian. Also with respect to age, infants under 2 years of age are very rarely affected and adults rather less frequently than adolescents. Among adults there is an increased incidence among those with mental disease. The authors tested the proposition that under identical conditions of exposure individuals might show a varying susceptibility to infection, apart from the influence of unhygienic habits, by taking weekly peri-anal swabs from 14 children living under the same conditions favourable to parasitism throughout a period of 7 months.

The findings, recorded graphically, indicate that 9 children remained relatively free or lightly infected whereas 5 others were heavily infected. The authors conclude that certain persons exhibit a partial degree of immunity to invasion by *Enterobius vermicularis*.

Frederick J. Wright

KERSHAW, W. E., ST. HILL, C. A., SEMPLE, A. B. & DAVIES, J. B. M.
The Distribution of the Larvae of *Trichinella spiralis* in the Muscles, Viscera and Central Nervous System in Cases of Trichinosis at Liverpool in 1953, and the Relation of the Severity of the Illness to the Intensity of Infection. *Ann. Trop. Med. & Parasit.* 1956, Dec., v. 50, No. 4, 355-61, 2 figs.

The authors describe in greater detail laboratory investigations relating to the outbreak of trichiniasis at Liverpool in 1953, the epidemiological and clinical features of which were described by SEMPLE *et al.* [this *Bulletin*, 1954, v. 51, 822].

In the 1953 outbreak muscle biopsies were made, usually at sites such as the deltoid or pectoral muscle or the outer aspect of the thigh, where pain and muscle tenderness were most marked. These were made from 16 of the 82 patients traced and included cases of widely different severity. The present paper has particular reference to the distribution of the larvae of *Trichinella spiralis* found and to the relationship between the severity of the illness and the severity of the infection.

Two patients among the 82 proved or suspected died, one from a "cardiac complication", the other from pulmonary embolism. The clinical history and autopsy of the first of these have been described

[*loc. cit.*]. The autopsy of the other case showed nothing noteworthy, apart from the embolus.

The distribution of the larvae in the muscles, viscera and central nervous system of these 2 patients is shown in figures. In the first, with a heavy infection, the concentration of the larvae in the skeletal muscles was uniformly high and of the same order, being highest in the forearms; in the intercostal muscles it was similar to that in the skeletal muscles; in the tongue it was higher still; in the oesophagus it was low; no larvae were found in the brain, heart, aorta, liver, spleen, kidney or bladder.

In the second patient, with a light infection, the concentration of larvae in the skeletal muscles was uniformly low and of the same order, being again highest in the forearms, but in the calves not quite so high; in the intercostals it was similar to that in the skeletal muscles; in the diaphragm it was higher, but not so high as in the forearms and calves; no larvae were found in the tongue, oesophagus, brain, heart, stomach, pancreas, spleen, liver, kidney, bladder or uterus.

A table shows the relation of the severity of the illness to the severity of the infection; but the biopsies were done in the third and fifth weeks of the infection and the rate at which the concentration of the larvae in the muscles increased is not known, nor can the categories mild, moderate and severe infection be precise. In general the clinically more severe infections showed high concentration of the larvae and the clinically milder ones a lower concentration; but one mild case—the only young patient infected—showed a high concentration of larvae, although young subjects are believed to tolerate the infection better. Clinical signs of involvement of the central nervous system occurred only in patients with a high concentration of larvae in the muscles.

Comparing the findings with earlier records of the concentration of larvae in the pig, the authors find that, although it may be true that in the pig the diaphragm is the site most often and most intensely invaded by the larvae, in man routine autopsy of the diaphragm may not be reliable as a means of assessing the presence or absence of the larvae; the somatic muscles should also be examined, although this may not be necessary when the infection is heavy. Although there was virtually complete absence of larvae from the viscera and central nervous system, there is much evidence that larvae reach these organs and are destroyed in them, the destruction causing obvious clinical manifestations.

In the Liverpool outbreak the most intense infection was about 100 larvae per gm. of muscle. Earlier authors quoted recorded 900 larvae per gm. and 900–1,000 larvae per gm. [*this Bulletin*, 1937, v. 34, 880].

G. Lapage

PRICE, Stella G. & WEINER, L. M. **Use of Hemagglutination in the Diagnosis of Trichinosis.** *Amer. J. Clin. Path.* 1956, Nov., v. 26, No. 11, 1261–9. [11 refs.]

The possibility of using haemagglutination tests in the immune reactions of trichinosis was investigated, since in the serological tests commonly used in this infection the end point of the precipitin test is difficult to determine, and the complement-fixation test is often difficult to perform. The haemagglutination test involves the adsorption of protein antigen on the surface of sheep red cells treated with tannic acid which are then agglutinable by the highly diluted specific antiserum.

This test was successfully applied in artificial immunization with antigens made from *Trichinella spiralis*. The antigen was obtained from the larvae recovered from the muscles of infected guineapigs and white rats, and rabbits were immunized with repeated intravenous injections. Red cells were sensitized with a boiled extract of the larvae. [The laboratory procedures are given in detail and the results are compared with precipitin tests and complement-fixation tests, together with the results obtained with different protein fractions of the antigens.] In these circumstances the haemagglutination reaction is much more sensitive and more reliable than the precipitin and complement-fixation tests.

Studies are continuing, and it is suggested, with reservations, that a procedure based on the haemagglutination reaction might be of use in laboratory diagnosis of trichinosis.

[The sensitivity and specificity of this reaction under the conditions of artificial immunization with dead antigen suggest that the course of infections with *T. spiralis* should be followed in animals. The abstracter would point out that the diagnosis of infection with *T. spiralis* in man, with the institution of appropriate epidemiological measures, can only be made with certainty by demonstrating the parasite, and this is most easily done by muscle biopsy.]

W. E. Kershaw

ALICATA, J. E. **Observations on the Possibility of developing a Strain of *Trichinella spiralis* Resistant to Radiation.** [Research Notes.] *J. Parasitology*. 1956, Dec., v. 42, No. 6, 656-7.

SADUN, E. H. & NORMAN, L. **Effect of Single Inocula, of Varied Size, on the Resistance of Hamsters to *Trichinella spiralis*.** *J. Parasitology*. 1956, Dec., v. 42, No. 6, 608-12, 1 fig.

“Results of several experiments involving the use of 362 hamsters of approximately the same age and weight inoculated with graded single inocula up to 8,000 larvae indicate that hamsters are susceptible to infections with *Trichinella spiralis*. No significant differences in the ratio between the average number of larvae recovered and the size of inoculum was observed in groups receiving between 125 and 1,000 larvae. The time of the greatest worm elimination from the intestinal tract varied with the size of inoculum and occurred during the first week following inoculation.

"The LD₅₀ of hamsters of the age and size used was about 850 larvae. The size of the inoculum had an inverse relation to the average time of survival. In general, death occurred primarily at the time of the muscular phase when the inoculum was 3,000 larvae or less, and at the time of the intestinal phase when the inoculum was 4,000 larvae or more. The regularity of the results suggest the possibility of using lethal infections as an additional tool for immunological and chemotherapeutic studies."

DEFICIENCY DISEASES

GOUNELLE, H., DEMARCHI, M., RABII, H., RASHID, R., FINDAKLY, S., SELLOUMI, H. F. & COFMAN, S., with the assistance of F. SHAKER & BASMAJJI. Enquête de nutrition en Moyen-Orient sur de jeunes adultes. [**Enquiry into the Nutrition of Young Adults in the Middle East**] *Bull. Soc. Sci. d'Hyg. Alimentaire*. 1956, v. 44, Nos. 10, 11 & 12, 269-78, 2 graphs.

This paper records the results of a nutritional survey of young men in the army and police force in Baghdad. The ration scales laid down should have provided a satisfactory diet. However, a mild degree of anaemia was frequently found, and nutritional glossitis, vascularization of the conjunctiva and myoedema were common. The men were also often below the standard weight for their height. Intestinal and urinary parasites and perhaps a poor distribution of the rations may have been responsible.

R. Passmore

FERRO-LUZZI, G., LANZO, A. & MUELLER, R. **Survey on the Nutritional Status of an Ethiopian Community.** *Arch. Ital. Sci. Med. Trop. e Parassit.* 1956, Nov., v. 37, No. 11, 571-90, 7 graphs.

This paper records a detailed study of the food intake together with a clinical examination and some biochemical data of a group of 72 Ethiopian soldiers living in Asmara. The results will be of interest to a far wider circle than the Ethiopian military authorities and have application to the problems of most African communities.

The diet was based on millet of which the average intake was 770 gm./day. Meat consumption was 88 gm./day, and oil 16 gm./day. In addition there were dried peas, potatoes, sugar and red pepper. This yielded daily 3,490 calories and 115 gm. of protein, of which only 17 were of animal origin.

The mean haemoglobin value was 87%. Despite the added stimulus to haemoglobin formation provided by the altitude of Asmara, a mild degree of anaemia was common. The diet provided 38 mgm. of iron

daily, but most of this was from the millet and clearly did not become available for haemopoiesis.

There was no gross evidence of vitamin deficiencies. Phrynoderma (12 cases) and nasolabial seborrhoea (17 cases) were found. This low incidence of deficiency states occurred despite a mean daily intake of only 767 IU of vitamin A and 1.1 mgm. of riboflavin. The mean serum level of vitamin A was only 25 IU/100 ml.

The mean value of the serum proteins was 6.39 gm./100 ml., of which 3.34 was albumin and 1.43 gamma globulin. The serum albumin levels were thus lower and the gamma globulin levels higher than European standards. Commenting on this the authors write:

"It seems therefore that the changes observed in the serum proteins of our subjects cannot be related either to a primary malnutrition or to any actual pathological (conditioned) malnutrition, unless asymptomatic.

"In this regard it should be remembered that the Ethiopians, like the great majority of Africans, are usually asymptomatic carriers of numerous pathogenous bacteria and parasites and have a long history of chronic or acute infections since their first years of life.

"If such multiple infections and infestations actually present in our cases may be considered as not sufficient by themselves to justify the behaviour of their serum proteins, yet we may well understand how a long-lasting contact (over hundreds of years) with pathogenic organisms may be responsible for the alterations of specialized tissues and consequently of the proteins which derive from them.

"In other words it seems logical to us to interpret the changes observed in the serum of our subjects *not* as a consequence of an *actual* conditioned malnutrition, but rather as the sequela of hereditary conditions, as a sort of adaptation to them; in other words a kind of 'serological mutation', which actually becomes apparent after the first 6-8 months, of life."

A further study of these men was made during the Easter "fast". This lasts 65 days, but can hardly be called a fast, for the only item of diet eliminated was the meat and for this 100 gm. of potatoes (instead of 32 gm.) and 20 gm. of vegetables daily were substituted. There were few changes in either the clinical or biochemical findings, but the serum vitamin A rose to a mean of 43 IU/100 ml. A strict vegetarian diet for 65 days did not modify the serum protein level.

It is pointed out that "fasting" in this military community is very different from fasts in other communities, which "may well represent a true nutritional calamity for communities which are less controlled and more destitute than our brigade".

R. Passmore

PATEL, B. D. Malnutrition in Children. A Preliminary Report. *Indian J. Child Health.* 1956, Dec., v. 5, No. 12, 679-86, 2 figs. [14 refs.]

Of those admitted to a children's hospital in Bombay, 4-5% were recorded as suffering from malnutrition. However, this is not a true

reflection of incidence, which is probably much higher. Wasting and oedema were the main clinical features found. Skin and hair changes, though often present, were variable. The liver was enlarged in one-third of the patients. Liver biopsy did not show changes closely associated with the clinical condition, though fatty changes were often present and sometimes severe. Muscle biopsy showed irregular changes such as atrophy, increase in sarcolemma nuclei and fatty changes.

R. Passmore

BACK, E. H. **A Nutritional Survey of Small Farmers in Jamaica in 1955.** *West Indian Med. J.* 1956, Sept., v. 5, No. 3, 189-95, 1 map.

This paper records the results of a clinical examination of 438 persons, the families on 70 small farms in 9 districts of Jamaica. There were 195 children, of whom only 14 were recorded as undernourished, although 41 were underweight. In 15 the liver was enlarged. Among the adults the majority were physically fit. But 19% had a palpable liver. An interesting feature was the incidence of hypertension which was very irregular. In two districts 14 out of 24 and 8 out of 23 adults had hypertension (the criteria for the diagnosis are not stated). In other districts hypertension was not common.

Dental caries was also common, but much more severe in some areas than in others.

R. Passmore

GANDRA, Y. R. Inquérito sobre o estado de nutrição de um grupo da população da cidade de São Paulo. IV—Investigação sobre a ocorrência de deficiência de ácido ascórbico. [**Nutritional Study on a Population Group in the City of São Paulo. IV. Study of the Incidence of Ascorbic Acid Deficiency**] *Arquivos Facul. de Hig. e Saúde Pública Univ. de São Paulo.* 1956, June-Dec., v. 10, Nos. 1/2, 89-111, figs. 18-21 (coloured) & graph 15. [30 refs.] English summary.

This is a continuation of a large-scale study of nutrition in São Paulo, Brazil [this *Bulletin*, 1956, v. 53, (1372)]. The author discusses at length, and with many tables, a clinical and biochemical study designed to detect deficiency of ascorbic acid among 4,208 persons believed to be in normal health.

Signs and symptoms of this deficiency were relatively high. The relation of swollen gums, cutaneous manifestations and other lesions are discussed statistically. Blood levels of ascorbic acid were determined in 331 persons: 29.3% were considered to be deficient. The mean value was 917.2 mgm./100 ml. of whole blood. The variations in the levels in different persons and over periods of time are discussed. No relation

could be found between blood concentrations of vitamin C and the signs and symptoms of ascorbic acid deficiency, nor was there any correlation with anaemia.

H. J. O'D. Burke-Gaffney

GANDRA, Y. R. Inquérito sobre o estado de nutrição de um grupo da população da cidade de São Paulo. V—Resultados das dosagens de proteínas totais, fosfatase e hemoglobina, das contagens de eritrócitos e dos exames de fezes. Alguns sinais clínicos gerais de desnutrição. [Nutritional Studies in a Population Group in the City of São Paulo. V. Estimation of Total Proteins, Phosphatase and Haemoglobin, Erythrocyte Counts and Examination of Faeces, together with some General Signs of Malnutrition] *Arquivos Facul. de Hig. e Saúde Pública Univ. de São Paulo*. 1956, June-Dec., v. 10, Nos. 1/2. 113-26, fig. 22. [13 refs.] English summary.

This paper is on the same full lines as its predecessor [above]: 4,208 persons were studied. The mean value for total protein was 7.49 gm./100 ml. of whole blood in 457 persons: mean alkaline phosphatase was 6.27 King-Armstrong units. Red cell and haemoglobin value in 343 persons were within normal limits. The MCH gave an average of 28.04 $\gamma\gamma$. No correlation was found between low haemoglobin rates and mucosal pallor.

1,269 samples of stool were examined by a simple flotation method: half of them were negative and the commonest parasites found were *Ascaris* (24%), hookworms (15%), *Trichuris* (9%). *E. histolytica* was found in only 3 specimens.

Among the general signs noted were winged scapulae (15.6%) and spider telangiectasis (7.9%). In 21.6% of persons subcutaneous fat was considered to be excessive and in 36% diminished.

H. J. O'D. Burke-Gaffney

CRUICKSHANK, E. K. **A Neuropathic Syndrome of Uncertain Origin. Review of 100 Cases.** *West Indian Med. J.* 1956, Sept., v. 5, No. 3, 147-58, 2 figs. [30 refs.]

The clinical features of 100 patients with a neuropathic syndrome observed in University College Hospital, Jamaica, are described. The four main lesions were: (a) upper motor neuron damage (93); (b) damage to the first sensory neuron, either in the peripheral nerve or in the cord (54); (c) retrobulbar neuropathy (26); (d) eighth nerve deafness (12). The onset was sudden in only 11 patients; in the remainder the disease developed slowly, but after a few months appeared to become stationary. The sexes were equally affected and the disease arose in all age-groups, though it was commonest in middle life. There was only one death and no autopsy was possible.

It is pointed out that the disease differs in essentials from all the neurological disorders known in European medicine. (The differential diagnosis may be difficult in individual cases; for instance many patients when first seen might be considered to have disseminated sclerosis, but the course of the two conditions is quite different.) The syndrome does, however, present a clinical picture virtually the same as the neurological disorders found in prisoner-of-war camps in the Far East, in which the author had personal experience. It is natural therefore to consider the possibility of a dietary cause. Detailed dietary histories of the patients were taken. Although many lived on very poor diets, 24 were recorded as having good or very good diets (meat or fish 3-4 times per week and eggs, milk, green vegetables and legumes frequently). A specific dietary toxin is another possibility that is discussed. The paper ends with a plea for more research (a) on the epidemiology of the disease and (b) on the fundamental metabolism of myelin.

R. Passmore

SYMONDS, B. & MOHAMMED, I. **"Sugar Babies" in South Trinidad.** *West Indian Med. J.* 1956, Sept., v. 5, No. 3, 159-66, 2 figs.

The clinical and autopsy features of 20 fatal cases of "sugar babies" are reported from San Fernando, Trinidad. At autopsy the most striking finding was the fatty liver. Treatment of the condition is discussed and the importance of an adequate protein intake during the first year of life is stressed.

[It is not made clear what special features these 20 children had to justify the unusual and imprecise diagnosis "sugar baby". This seems a most unsatisfactory term and it is to be hoped that it will not appear again.]

R. Passmore

REDDY, D. G. & SRIRAMACHARI, S. **Histological Changes in Cirrhosis of the Liver.** *Indian J. Med. Sci.* 1956, Dec., v. 10, No. 12, 944-50, 8 figs. on 2 pls. [31 refs.]

This paper describes the histology of the liver in 25 autopsy cases of cirrhosis seen at Visakhapatnam. In the earliest cases, histologically indistinguishable from malnutrition, diffuse loss of cytoplasmic protein and fatty change are present. Later, persistent cellular infiltrates evoke a fibroblastic proliferation; nodular parenchymal regeneration occurs and finally the linking up of connective tissue septa and formation of intra-hepatic anastomotic channels with progressive disorganization of lobular architecture. The earlier changes are reversible. Judicious use of liver function tests and liver biopsy makes more precise diagnosis possible and allows for rational treatment.

R. Passmore

WATERLOW, J. C. **The Protein Content of Liver and Muscle as a Measure of Protein Deficiency in Human Subjects.** *West Indian Med. J.* 1956, Sept., v. 5, No. 3, 167-74, 1 fig.

This paper starts with the assertion that the most serious nutritional problem in the world to-day is a shortage of protein. It then goes on to suggest measures for the assessment of protein deficiency suitable for clinical use. The degree of fatty infiltration of the liver, as estimated in biopsy samples, is not closely associated with the clinical condition (except when severe). The nitrogen content of the liver, if it is to be of value as a guide to the size of the protein store, must be expressed in terms of a suitable constant standard. Data are presented which show that in biopsy specimens taken from 12 patients good feeding caused the ratio N/DNA (de-oxyribonucleic acid) to rise from 49 to 83. The DNA content of the liver is relatively unaffected by the nutritional state of the patient, though it may be increased when there is cell hyperplasia in the organ. The N/DNA ratio in the muscles is, however, reduced more than in the liver as a result of malnutrition. This is based on analyses of muscle tissue obtained at autopsy. It is suggested that the main loss of protein is from muscle and not from liver. Measurements of the protein depletion of the tissues may provide a baseline for assessing the value of simpler tests.

[This paper is a clear and concise statement of the problem of measuring protein deficiency in man.] R. Passmore

SARROUY, C. & CLAUSSE, J. La stéatose hépatique au cours des syndromes de dénutrition du nourrisson. [**Fatty Degeneration of the Liver in the Course of the Syndromes of Malnutrition in Infants**] *Algérie Méd.* 1956, Feb., v. 60, No. 2, 81-90.

This paper is a summary of many years of clinical experience of the disease in Algeria. The importance of a combination of infections and dietary deficiencies in causing liver disorders is stressed. For treatment skimmed milk enriched with an acid hydrolysate of proteins (1% to 3%) is used. Methionine, inositol and choline are given in doses of 1 to 4 gm. per day throughout the stay in hospital. The elimination of parasitic infections, especially giardiasis, is most important. If the conditions in the home are unhygienic, the child must be kept in hospital for a long period. At least 2 to 3 months are necessary to allow for repair of the liver. R. Passmore

KINNEAR, A. A. & PRETORIUS, P. J. **Liver Function in Fatal Kwashiorkor.** *South African Med. J.* 1957, Feb. 23, v. 31, No. 8, 174-5. [10 refs.]

"Fractionation of the serum proteins, the thymol turbidity test, the thymol flocculation test, the serum colloidal gold test, the serum colloidal

red test, the v.d. Bergh reaction and the total serum bilirubin showed neither diagnostic nor prognostic value in fatal kwashiorkor.

"The bromsulphalein test probably has prognostic significance if repeated serially."

[See this *Bulletin*, 1956, v. 53, 1262.]

KHO LIEN-KENG. **Erythroblastopenia with Giant Pro-Erythroblasts in Kwashiorkor.** *Blood*. 1957, Feb., v. 12, No. 2, 171-82, 9 figs. [25 refs.]

An acute aplastic anaemia occurred in 7 out of 92 children with kwashiorkor aged $1\frac{1}{2}$ to 8 years, studied in Djakarta. Giant pro-erythroblasts appeared in the bone-marrow. The condition arose independently of treatment. 3 of the children died, but 4 recovered with a reticulocyte crisis, sometimes without specific haematological treatment. This sudden failure of the bone-marrow may be caused by a chronic deficiency of dietary protein, superimposed on frequent infections. *R. Passmore*

MERSKEY, C. & HANSEN, J. D. L. **Blood Coagulation Defects in Kwashiorkor and Infantile Gastroenteritis.** *Brit. J. Haematol.* Oxford. 1957, Jan., v. 3, No. 1, 39-49, 5 figs. [31 refs.]

Purpura occurred in 9 out of 58 patients with kwashiorkor studied in Cape Town. The disease was often associated with low platelet counts. A significant decrease in the prothrombin index was found in most patients with kwashiorkor and gastro-enteritis. This was attributed to a deficiency of Factor VII and sometimes of prothrombin. These defects were made good rapidly when a suitable diet was given. Vitamin K deficiency and a grossly fatty liver may have been in part responsible, but the relationship between these factors and the purpura was not completely clear.

R. Passmore

GELFAND, M. & CARR, W. R. **The Results of Treatment of Kwashiorkor in Salisbury with High Protein Diets.** *Central African J. of Med.* 1956, Dec., v. 2, No. 12, 425-9. [16 refs.]

The death rates from kwashiorkor among children admitted to hospital in Salisbury, Southern Rhodesia, remained high even with the best treatment—a high protein diet, Darrow's solution, antibiotics and sulphonamide drugs. In a series treated with this regime 21 out of 42 children died, but those who recovered did so more quickly than children on a high protein diet alone. The reason for this high mortality is not clear. It is suggested that results might be better if the children were treated with barrier nursing to reduce intercurrent infections. Vitamins did not appear to be essential in the treatment. *R. Passmore*

HAEMATOLOGY

ROBERTSON, Jean A. **Post-Partum Blood Picture in Singapore.** *Brit Med. J.* 1957, Mar. 23, 684-5, 2 figs. [12 refs.]

"The haemoglobin levels and the packed red-cell volumes of working-class mothers in Singapore were estimated two to four days after delivery. The mean haemoglobin level was 11.85 g./100 ml. and the mean packed red-cell concentration 35.3%, a finding which conforms closely with observations made in countries with a high standard of living and a temperate climate. This confirms that tropical anaemias are due to other causes than a warm climate."

[See this *Bulletin*, 1955, v. 52, 81; 1956, v. 53, 97.]

LEHMANN, H. **Haemoglobin and its Abnormalities.** *Practitioner.* 1957, Feb., v. 178, No. 1064, 198-214, 7 figs. [62 refs.]

The increase in the number of known abnormal haemoglobins and in the accumulating knowledge of their complex nature makes this subject somewhat perplexing to those who have not made a special study of it. This paper, by a recognized authority who has himself made a very considerable contribution to that knowledge, is therefore especially welcome. Readers of this *Bulletin* will be familiar with much of the work on which the review is based, but will be grateful for this clear and informative summary of the present position, which brings together a large number of technical records.

The author begins with a brief reference to the haemoglobin molecule and changes in the haem and then discusses abnormalities of globin synthesis. He makes clear the distinction between haemoglobinosis, which is the result of variation in haemoglobin synthesis, and haemoglobinopathy, in which such variation results in disease. The important features of the known haemoglobinoses are tabulated.

After a reference to the normal haemoglobins, adult (A) and foetal (F), the author discusses thalassaemia and sickle-cell haemoglobin at length and this is followed by observations on the 9 non-sickling variants. Traits and disease are discussed and reference is made to that interesting syndrome, microdrepanocytic disease.

Finally, the racial differences in the distribution of haemoglobinosis are described and geographical distribution shown in a map. The important subject of sickling and malaria is discussed fully.

The author stresses the increasing importance of haemoglobinosis and haemoglobinopathy. In the Lake Kopias area of Greece, the latter is the most pressing medical problem, now that malaria has been eradicated. It is estimated that in the Commonwealth countries of West Africa alone 3 children in 100 might suffer from a haemoglobinopathy. The subject

also has medico-legal implications, as, for example, in connexion with questions of paternity and blood transfusions.

Readers will undoubtedly find many of their difficulties resolved by this admirable review.

H. J. O'D. Burke-Gaffney

Do ROSÁRIO, M. R. & PARREIRA, F. Anemia hemolítica crónica hereditária com drepanocitose e esferocitose drepanoesferocitose. [**Chronic Hereditary Haemolytic Anaemia with Sicklaemia and "Sicklaemia-Spherocytosis"**] *Cadernos Científicos*. Lisbon. 1956, Dec., v. 4, No. 4, 347-76, 4 figs. on 2 pls. & 5 charts. [Numerous refs.] English summary.

An account of a case with unusual findings.

ALLARD, R. A propos de la conservation génétique du Sickle cell Trait. [**Observations on the Maintenance of the Sickle-Cell Trait**] *Ann. Soc. Belge de Méd. Trop.* 1955, Dec. 31, v. 35, No. 6, 649-60. [15 refs.]

The author examined 3,366 subjects at Befale in the Belgian Congo. The proportion having the sickle-cell gene was 23%. There was no significant variation in proportion at different ages. It was found that the carriers of the gene had more children than normal people. The overall number of children of 194 sickling fathers was 246 against 585 children of 574 non-sickling fathers. The difference is highly significant. It is concluded that the high mortality among those with sickle-cell anaemia, *i.e.*, those with the double dose of the gene, is balanced by the higher fertility of the carriers with the sickle-cell trait. J. A. Fraser Roberts

LEWIS, S. M., ANDERSON, C. G. & BASKIND, E. **Homozygous Haemoglobin-C Disease in a White Family with special reference to Blood Autolysis Studies.** *Brit. J. Haematol.* Oxford. 1957, Jan., v. 3, No. 1, 68-76, 4 figs. [16 refs.]

"This paper records the occurrence of homozygous haemoglobin-C disease in a family of white South Africans of European (Dutch) descent. Both parents, who are distant cousins, carry the haemoglobin-C trait.

"Clinical features are discussed, and the unusual presentation with haematuria emphasized.

"Electrophoretic studies showed the presence of homozygous haemoglobin C in three members of the family, and the trait in one member, in addition to the presence of the trait in both parents.

"Autohaemolysis and osmotic fragility studies after incubation at 37°C. are discussed. The pattern of haemolysis is distinct from that seen in

Mediterranean anaemia. This suggests that this test may be of value in distinguishing between these two conditions."

HYNES, M. & LEHMANN, H. Haemoglobin D in a Persian Girl: Presumably the First Case of Haemoglobin-D-Thalassaemia. *Brit. Med. J.* 1956, Oct. 20, 923-4, 2 figs. [16 refs.]

Haemoglobin D was first discovered in North America [this *Bulletin*, 1955, v. 52, 928] but it is now known that it is not rare among inhabitants of North-Western India [*ibid.*, 1956, v. 53, 924, 1166]. This is the first report of its occurrence in a Persian and in addition to the anthropological interest of the case it is rendered more interesting by being the first in which haemoglobin D has been reported in association with thalassaemia.

The patient was pale but there were otherwise no remarkable clinical findings. Haematological investigation revealed mild anaemia and extreme microcytosis without iron deficiency. The microcytosis was caused by a reduction of the thickness rather than the diameter of the red cells. On electrophoresis a single band of haemoglobin was seen in the position of haemoglobin S or D; as the cells did not sickle the haemoglobin must have been of the D variety, a deduction subsequently confirmed by solubility tests. Family studies indicated that the haemoglobin had been inherited heterozygously and it therefore appeared that a thalassaemia gene had also been inherited, and had suppressed the formation of haemoglobin A.

A. W. Woodruff

VENOMS AND ANTIVENENES

ROSE, W. Snakes—mainly South African.

This book was reviewed on p. 634.

REID, H. A. Sea-Snake Bite Research. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Nov., v. 50, No. 6, 517-38, 4 figs. [Numerous refs.] Discussion 539-42 [WRIGHT, E. A.; FAIRLEY, N. H.; TAYLOR, J.; REID, H. A. (in reply)].

The geographical distribution and habits of Hydrophiidae are discussed in an interesting introduction. A survey of fishing villages in north-west Malaya revealed, after the usual social difficulties, a total of 144 cases of sea-snake bite; 102 of these cases occurred over the 10-year post-war

period. The author considers that the total is probably a gross understatement of the true incidence.

Patients were bitten more often on the lower limb than the upper. Two-thirds were bitten while fishing at sea. The reported death rate varies from 3 to 25%. In one village, between 1950 and 1955, 150 cases were admitted with only 5 deaths. The author's own figures show 25 deaths in 102 cases. One of the striking features of the survey was the relatively large number of bites followed by trivial or no toxic effects.

Coincident with the survey a collection of sea-snakes was made in order to study their habits, and to investigate the possibility of developing an antivenene. A total of 600 snakes were studied (280 living). 11 species were identified, of which the commonest were *Lapemis hardwickii*, *Enhydrina schistosa* and *Hydrophis cyanocinctus*. Living snakes were kept originally in sea water and later in saline (0.9 kgm. to 26 litres of tap water). Survival varied according to species between 55 and 208 days. Methods of handling the snakes and "milking" them for venom are described. When the snake was encouraged to bite through a plastic membrane some of the venom was deposited on the outside as well as into the underlying spoon. [The author remarks that this is "contrary to what is found with cobras and vipers", a statement which is not acceptable to the abstracter.] Venom yields for the various species of snakes examined are given in a comprehensive table; the yields were poor compared with those from land snakes, even after milking of the venom glands.

The rate of absorption of venom after biting is discussed. Experiments on dogs showed that a lethal dose can be absorbed within 3 minutes, and that no toxic effects might follow even after a bite in which active jaw contraction on the part of the snake could be demonstrated and venom was recovered in subsequent milking. Presumably the amount of venom injected at the time of biting is the basic factor which decides whether or not poisoning will follow. The literature on the route of absorption of the venom is reviewed and the author suggests that in view of the possibility of absorption *via* lymphatics "avoidance of movement is more important than a tourniquet in some types of snake-bite".

The autopsy findings in 3 of the author's cases are summarized. Petechial haemorrhages were found in the subpleural and subendocardial tissues; there was some fatty centrilobular hepatic degeneration in one case. Two patients had developed haemoglobinuria in life; in one the kidneys were "congested", in the other "granular eosinophilic material" was present in many tubules. No conspicuous changes were observed in the brain, brain stem or basal ganglia.

Clinical features of sea-snake poisoning are described. "From minutes to several hours after the painless bite, there develop trismus, a cold feeling, increased sweating, ptosis, difficulty in swallowing, muscular weakness progressing to flaccid paralysis and, in very severe cases, respiratory failure. Haemoglobinuria is common in fatal cases. The

syndrome is similar in most respects to that of other neurotoxic venoms. It differs from cobra poisoning in complete absence of local pain or swelling at the site of the bite and a longer incubation period; from cobra and Australian snake poisoning, in rarity of drowsiness, ataxia, muscle tremors and haematuria; from krait bites, by absence of abdominal pain, haematuria and melaena . . .; from the S. American rattler, *C. terrificus* (which although a viper has neurotoxic venom), in rarity of visual effects."

In discussing treatment the author regards immediate immobilization of the limb as at least as important as the application of a tourniquet. The author does not advocate the latter, which he regards as useful "only from a psychological viewpoint".

In reviewing the literature on the efficacy of antivenene therapy in general the author states:

"Critically examined with due regard to the many variables, the effectiveness of treatment at present available for neurotoxic snake poisoning, including specific antivenene (in dose and route commonly given), remains in doubt. Most of the measures advocated do more harm than good. . . ."

He regards the results of employment of specific antivenenes as "far from encouraging" and considers that serum reactions must be regarded as complicating factors. Although respiratory failure is the cause of death in neurotoxic poisoning no methods of artificial respiration seem to be efficient. Cortisone and related compounds and antihistaminics are probably of little value in regard to the venom but may be useful for preventing serum reactions. Local anaesthetics are useless.

The author's suggestions for treatment of sea-snake bite include these points: leave the bite alone; splint the whole limb and move it and the body as little as possible; inject polyspecific antivenene plus hyaluronidase intramuscularly; transfer quickly to hospital and administer cortisone and further antivenene if required. He considers that the outstanding problems are to provide more effective neurotoxic antivenenes and to determine the effective dose in relation to the time which has elapsed between the bite and treatment.

This interesting provocative paper stimulated some discussion. Dr. E. A. WRIGHT described experiments in which the venom of *Enhydrina schistosa* was injected in minute but increasing doses into the medulla oblongata in rabbits. The results indicated that the venom can damage this region, which is not the case with botulinum toxin. He concluded that the venom can act on both the central and peripheral nervous systems; the precise mode of action was unknown. Sir Neil Hamilton FAIRLEY was critical of Dr. Reid's views on the efficacy of local and antivenene treatment. He was convinced (like many of the audience) from personal experience that intravenous administration of antivenene, provided it contains the antivenom specific to the snake, "is frequently a life-saving measure". He stressed the importance of giving the antivenene intravenously and not intramuscularly as recommended by Dr. Reid.

Sir John TAYLOR said that no case of sea-snake poisoning was reported by the American forces during their Pacific campaign. He was convinced of the efficacy of antivenenes when used properly and in time. It would be well worth while to attempt the preparation of specific antivenene for sea snakes for local use.

Dr. Reid in reply said he preferred intramuscular injection of antivenene to intravenous in view of the high incidence of serum reactions. He hoped that a successful polyvalent antivenene could be prepared from the venoms of *E. schistosa* and *H. cyanocinctus*. He did not share the confidence of speakers in the efficacy of available antivenenes.

[This paper is full of provocative comments which will serve the very useful purpose of rousing controversy and stimulating further research. The abstracter commends the following statements to those interested in snakes and venoms. "Viper bites . . . are rarely fatal. It is the neurotoxic snakes that kill mankind." "How many have been killed by antivenene?" "Many papers have, of course, given figures from which it is concluded that antivenene was beneficial, but none, to my knowledge, will stand critical scrutiny. . . . Most patients suffering from snake-bite recover in spite of, rather than because of, antivenene." It is interesting to note that in spite of his gloomy views on antivenene therapy, the author recommends it in his instructions for treatment.]

B. G. Maegraith

MOURA GONÇALVES, J. Estudos sôbre venenos de serpentes brasileiras.

II—*Crotalus terrificus crotaminicus*, subespécie biológica. [Studies on the Venoms of Brazilian Snakes. II. *Crotalus terrificus crotaminicus*, a New Subspecies] *Anais Acad. Brasileira de Ciencias*. 1956, Sept. 30, v. 28, No. 3, 365-7, 1 fig.

The English summary appended to the paper is as follows:—

"A new subspecies of *Crotalus terrificus* is described under the name of *Crotalus terrificus crotaminicus*.

"The criterion of classification is based on the presence of a powerful toxin (crotonamine) since the morphological differences are not clearly defined."

MOURA GONÇALVES, J. & ARANTES, E. G. Estudos sôbre venenos de serpentes brasileiras. III.—Determinação quantitativa de crotonamina no veneno de cascavel brasileira. [Studies on the Venoms of Brazilian Snakes. III. Quantitative Determination of Crotonamine in the Venom of *Crotalus t. crotaminicus*] *Anais Acad. Brasileira de Ciencias*. 1956, Sept. 30, v. 28, No. 3, 369-71, 1 fig.

The English summary appended to the paper is as follows:—

"A method for quantitative determination of crotonamine in the venom of *Crotalus t. crotaminicus* is described based on differentiation by paper

electrophoresis. A correction factor was established for the binding of amidoschwartz with crostamine."

LAUBSCHER, H. H. **Snake Bite: a Case Report.** *South African Med. J.* 1957, Feb. 2, v. 31, No. 5, 102-3, 3 figs.

An African boy of 12 was bitten on the left hand and the lobe of the left ear by a night adder [*Causus rhombeatus*]. He was examined 18 hours later. General condition was normal. The ear showed no changes but the left arm was grossly swollen from elbow to finger tip and the radial arterial pulse could not be felt. Antiserum was given [no details] and followed by courses of aureomycin, penicillin, Anthisan and Ronicol [nicotiny alcohol]. The hand and forearm were incised. During the incision of the dorsum of the forearm an artery was accidentally severed. Apart from severe epistaxis on the third day the general state of the patient remained good. In due course the swelling of the arm and hand subsided and skin grafts were made over the dorsum of the hand. The whole group of extensor tendons was destroyed between the wrist and heads of the metacarpals.

Discussion centres on the interesting point that severe local effects of the bite were not accompanied by any general toxic response, and on the "great importance of even a small artery in a circulation seriously impeded".

B. G. Maegraith

LEFROU, G. & MICHARD, V. Contribution à l'étude de l'action des antihistaminiques dans le traitement des envenimations par morsures de serpents. [**Action of Antihistamines in the Treatment of Snake Bite**] *Bull. Soc. Path. Exot.* 1956, Sept.-Oct., v. 49, No. 5, 936-45.

Theoretically antihistamines might ameliorate the signs of toxicity in cases of snake bite where the patient was suffering from shock; on the other hand, they might aggravate the reaction in view of their hypotensive activity. The authors have studied the action of mepyramine (Neo-antergan) in guineapigs, rabbits and monkeys injected with the venom of the Gabon viper (*Bitis gabonica*) and the mamba (*Dendraspis viridis*). Mepyramine had little effect on the action of the viperine venom in guineapigs and monkeys; in rabbits the toxic effects of the venom were greatly accelerated and convulsive crises appeared a few minutes after the injection. The toxic effects of the colubrine venom were accelerated by mepyramine in all animals.

The reactions of man to the venoms should in theory be closely similar to those of the monkey. The authors conclude, in agreement with other workers, that in human beings mepyramine should not be used.

[This is an interesting paper with clear details of well-conceived experiments.]

B. G. Maegraith

MARTIN, P. & MATHIEU, C. Premiers résultats de la sérothérapie spécifique des envenimations par *Ancistrodon rhodostoma* Boie au Sud-Vietnam. [**First Results of Specific Serotherapy for Bite of *Ancistrodon rhodostoma* in South Vietnam**] *Bull. Soc. Path. Exot.* 1956, Sept.-Oct., v. 49, No. 5, 843-6.

Two Vietnamese patients were first seen some hours after being bitten on the foot by *Ancistrodon rhodostoma*, by which time serious toxic effects had developed. They were immediately given 10 cc. specific antiserum (made by the local Pasteur Institute) intramuscularly and were given a similar injection the following day. Both received a course of penicillin lasting some days. Patients were discharged cured in 8 and 30 days respectively.

A third patient who was seen half an hour after having been bitten on the foot was given 10 cc. antivenene intravenously as well as penicillin and Phenergan [promethazine] (there was pronounced shock). Recovery was dramatic. The patient was discharged at his own request after 24 hours, suffering only from slight pain in the region of the bite. He was perfectly well 12 days later.

The authors conclude that the antivenene is very active, especially when administered intravenously.

B. G. Maegraith

GAIL, R. & RAGEAU, J. Premières observations sur un poisson marin venimeux de la Nouvelle-Calédonie: la Synancée (*Synanceia verrucosa* Bloch). [**Observations on a Poisonous Marine Fish, *Synanceia verrucosa*, in New Caledonia**] *Bull. Soc. Path. Exot.* 1956, Sept.-Oct., v. 49, No. 5, 846-54, 4 figs. & 1 pl. [23 refs.]

The chance capture of a live stone fish on a Noumea beach enabled the authors to study its venom apparatus and the physiological effects of the sting.

The zoological identification and classification are discussed. There is an excellent (and wholly repellent) photograph and some good drawings of the fish and its poison spines. A tree frog stabbed in the thigh with a spine with poison glands attached remained unaffected. Injection of the contents of the glands killed a similar frog in paralysis in 4 hours, the heart continuing to beat for a further hour and a half.

A male rat was stung several times at the base of the tail and on the flanks and back by erected spines in the living fish. Death occurred after 7 hours. A second rat injected with venom died in 16 hours. A third rat was scratched with a dorsal spine and suffered only local reactions: the same applied to the observer. A dog injected with venom died inside a minute.

The authors conclude that the venom of the stone fish is highly toxic. Cases of human poisoning are, however, rare. There is no specific treatment.

[Local remedies include the application of a clove of garlic to the sting wound. Presumably the fish then swims off in the opposite direction.]

B. G. Maegraith

TOXOPLASMOSIS

WILHELM, O., SKEWES, E. & SCHIAPPACASSE, E. La toxoplasmosis en Concepción. [**Toxoplasmosis in Concepción, Chile**] *An. Méd. Concepción*. 1956, June, v. 13, Nos. 1/2, 36-41, 2 figs. [15 refs.] English summary.

The third case in Chile. [See this *Bulletin*, 1952, v. 49 (650); 1956, v. 53, (240).]

SCHUHOVÁ, Věra, with the technical assistance of M. SPLÍTKOVÁ & Z. ŠAŠKOVÁ. Dlouhodobé kultury *Toxoplasma gondii* na He-La buňkách. [**Long-Term Tissue Cultures of *Toxoplasma gondii* in HeLa Cells**] *Českoslov. Epidemiol., Mikrobiol., Imunol.* Prague. 1957, v. 6, No. 1, 9-11. English summary (7 lines).

The CB strain of *Toxoplasma gondii* derived from the peritoneal exudate of an infected mouse has been maintained through 17 passages in stationary cultures of HeLa cells grown in 40 parts horse serum and 60 parts Hanks solution. The cytopathogenic effect was only partial, and many cells continued to multiply. Infected cultures could be maintained for as long as 6 months by changing the medium every 3-4 days, and parasites could be recovered in subcultures of supernatant fluid made at intervals, with a yield of infective organisms ranging from 5×10^4 to 3×10^5 per cc. The chronically infected cultures afforded a convenient means of maintaining a constant supply of the organisms, although the titres attained were 2 log. units lower than in peritoneal exudates.

D. J. Bauer

REID, J. D. & MANNING, J. D. **Clinical Manifestations of Toxoplasmosis in New Zealand.** *New Zealand Med. J.* 1956, Dec., v. 55, No. 310, 448-56. [36 refs.]

The authors report on the incidence and manifestations of toxoplasmosis in the vicinity of Wellington, New Zealand. They carried out a detailed and controlled series of examinations of sera by the dye test and a complement-fixation test using as antigen homogenized infected chorio-allantoic membrane. Positive tests indicated widespread subclinical toxoplasmosis; therefore consideration of rising titres, the support given

by the complement-fixation test to the dye test and the levels of titres must be given in any individual case. In estimating the probable part played by toxoplasmosis in any particular clinical syndrome, the occurrence of positive reactions in a greater percentage or to a higher titre than in comparable age-groups not exhibiting these symptoms, may prove to be significant. The authors found among 38 cases of lymphadenopathy, where alternative diagnoses had not been substantiated, that there was evidence that toxoplasmosis was an important cause of the lymphadenopathy. The tests led to the diagnosis of toxoplasmosis in 13 of these patients, including 4 with enlarged painless glands (in 2 of whom a diagnosis of Hodgkin's disease had been proposed) and 3 in whom symptoms referable to the right iliac fossa were attributable to mesenteric adenitis. There were 3 examples of acute febrile lymphadenopathy, 2 others with vague symptoms and 1 originally suggestive of glandular fever but with persistent lymphadenopathy. Cat-scratch fever may be simulated and a positive skin test to cat-scratch antigen does not exclude toxoplasmosis.

18 cases of choroiditis were investigated. The results were inconclusive but it appeared likely that toxoplasmosis was the cause in some cases. 35 cases of anterior uveitis were investigated; 4 were suggestive of toxoplasmosis, but the role of toxoplasmosis in anterior uveitis is not yet established. Among miscellaneous eye disease there was suggestive evidence of active toxoplasmosis in a boy of 12 years with vernal conjunctivitis and in 1 case of Eale's disease. 16 patients with myocardial disease were investigated with inconclusive results, but one man in this group, showing only moderate titres (complement-fixation test 1 in 8, dye test 1 in 64), was a breeder of dogs, one of which died from generalized toxoplasmosis at the time of commencement of the patient's illness.

25 patients with a variety of cerebral disorders were investigated, and 1 showed serological and clinical evidence of possible toxoplasmosis.

[A cautious interpretation of a detailed and controlled investigation.]

Frederick J. Wright

WILDFÜHR, G. Tierexperimentelle Immunitätsversuche mit *Toxoplasma gondii*. [Experimental Studies on Immunity against *Toxoplasma gondii* in Animals] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1957, Feb., v. 113, No. 6, 435-52, 4 figs.

After some observations on the dye test titres reached in various experimental animals infected with toxoplasms, this paper reports work on immunization of experimental animals with toxoplasms. Rabbits actively immunized with inactivated toxoplasms were protected against otherwise lethal challenge doses, although it was not possible to achieve the same immunization in the golden hamster. Further, it was not possible to protect the hamster from lethal doses of toxoplasms by previous inoculation with high-titre rabbit serum. It is concluded that immunity against

toxoplasms is more a cellular defence mechanism than a function of the humoral antibodies, which nevertheless have a diagnostic value.

I. A. B. Cathie

DERMATOLOGY AND FUNGUS DISEASES

CONVERSE, J. L. **Effect of Physico-Chemical Environment on Spherulation of *Coccidioides immitis* in a Chemically Defined Medium.** *J. Bacteriology*. 1956, Dec., v. 72, No. 6, 784-92, 12 figs. [18 refs.]

“Studies were made on some physico-chemical environmental factors affecting the growth of the parasitic phase (spherule) of *Coccidioides immitis* in a chemically defined liquid medium. Most satisfactory production was obtained from young (7- to 14-day) well sporulated inocula, in a medium containing 0.67 per cent solids (total nutrient content) with initial pH values between 6.0 and 8.0, incubated at 37 C in complete darkness for 72 hr under reduced aeration.”

[See this *Bulletin*, 1956, v. 53, 928.]

MISCELLANEOUS DISEASES

BEET, E. A. **Rheumatic Heart Disease in Northern Nigeria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Nov., v. 50, No. 6, 587-92.

Of 358 patients admitted to hospitals under the care of the author in Northern Nigeria between 1951 and 1955, 82 were diagnosed as suffering from rheumatic carditis. The average age of these 82 patients was 24.6 years and the range 7-47 years. 9 children between the ages of 6 and 13 years were found to have established, disabling mitral stenosis. Mitral stenosis was encountered more frequently in women than in men in spite of the fact that male patients admitted for all causes greatly outnumbered women.

With regard to geographical distribution of rheumatic heart disease in West Africa it is pointed out that the disease has been reported to be uncommon in coastal districts [this *Bulletin*, 1955, v. 52, 689] and also that in Western Nigeria the incidence of haemolytic streptococci in the throats of schoolchildren is low [*Bull. Hyg.*, 1953, v. 28, 663]. Although comparable figures for Northern Nigeria are not available there is clinical evidence for believing that streptococcal throat infections are not uncommon.

Among the 82 patients, 45 had involvement of the mitral valve only,

11 involvement of the aortic valve only, 16 involvement of mitral and aortic valves, 7 involvement of mitral and tricuspid valves, 2 involvement of mitral, aortic and tricuspid valves and 1 had acute carditis. 10 patients had auricular fibrillation and 3 had heart block. Congestive heart failure was present in 53 of the patients, *i.e.*, 67%. Rheumatic nodules were not found in any case. 6 patients had bacterial endocarditis without a positive blood culture being obtainable. The mid-diastolic murmur associated with heart disease due to severe anaemia caused difficulties in differential diagnosis but mitral stenosis in Africans was found usually to be accompanied by a relatively high haemoglobin value.

A. W. Woodruff

SRIVASTAVA, J. R. **The Genetic Factor in Infantile Cirrhosis of Liver. A Preliminary Report.** *Indian J. Med. Sci.* 1956, May, v. 10, No. 5, 191-7, 1 fig. on pl. [14 refs.]

50 cases of infantile cirrhosis of the liver were studied [this *Bulletin*, 1955, v. 52, 76]. In 19 more than 1 child in the sibship was affected. In 7 there was evidence of affected persons in earlier generations. It is tentatively suggested that a recessive gene might be at least partially responsible, though other factors are likely to be of importance in determining whether or not genetic susceptibility is translated into the actual disease. Males are more commonly affected than are females, which might be due to sex-limitation in the action of the gene.

J. A. Fraser Roberts

MENZIES, D. W. & MILLS, K. W. **The Aortic and Skeletal Lesions of Lathyrism in Rats on a Diet of Sweet Pea.** *J. Path. & Bact.* 1957, Jan., v. 73, No. 1, 223-37, 30 figs. on 8 pls. [40 refs.]

PARASITOLOGY : GENERAL

GERWEL, C., KASPRZAK, W. & PAWŁOWSKI, Z. **Obraz inwazji przewodu pokarmowego ludności wiejskiej województwa poznańskiego cz. II. [Survey of Invasions of the Alimentary Tract in Rural Population of the Poznań District. Part II]** *Wiadomości Parazytologiczne.* Warsaw. 1957, v. 3, No. 1, 3-10.

The English summary appended to the paper is as follows:—

“The authors give the results obtained from examinations of 2169 persons—field workers and their families—in the Poznań district. The total percentage of persons infected with parasites, helminths and protozoa, amounts to 70·8. Of infrequently occurring helminthiasis was discovered *Fasciola hepatica* and *Hymenolepis diminuta* (1 case of each disease):

" Simultaneously with coprological investigations were examined soil and earth (Drygas) for the presence of eggs of parasitic worms. The presence of parasitic eggs in 64–100 per cent of soil samples is recorded in places with the highest intensity of invasions among the population.

" Table II and III demonstrate mixed invasions in man (2–4 different parasite species).

" The group of 7–9 years of age shows the highest percentage of children infected with all species of parasitic worms and protozoa, except *Entamoeba coli*. The intensity of *E. coli* invasion increases gradually with that age."

COUTINHO, J. O. Notas sôbre modificações do " MIFC " na conservação de fezes para pesquisa de cistos de protozoários. [**Modifications of the Merthiolate-Iodine-Formalin Technique in preserving Faeces for Examination for Protozoal Cysts**] *Arquivos Facul. de Hig. e Saúde Pública Univ. de São Paulo*. 1956, June–Dec., v. 10, Nos. 1/2, 65–70.

The English summary appended to the paper is as follows:—

" The author studies the techniques of the ' MIFC ' (merthiolate-iodine-formalin) commended in the preservation and coloration of the feces for research on helminth's eggs and cysts of intestinal protozoa.

" Introduces some modifications, substituting the tincture of merthiolate at the rate of 1:1000 by that of the mercury-chrome at 2:1000 and commends the employment of lugol after the preparation of the material to be examined.

" Verifies that, by studying comparatively both the duly modified ' MIFC ' and the ' Faust ', the results, obtained among 200 (two hundred) examinations carried out, show that the two methods are equivalent in the practice. Accentuates also that the material preserved in the solution of mercury-chrome-formalin is apt to be looked into under the usual techniques of enrichment. Considers that the modified ' MIFC ' is of large use in the coprological inquiries in the rural area."

ŠKRABALO, Z. & DEANOVIĆ, Z. **Piroplasmosis in Man. Report on a Case.**

Documenta Med. Geograph. et Trop. Amsterdam. 1957, Mar., v. 9, No. 1, 11–16, 6 figs. [14 refs.]

A man aged 33 years was admitted to hospital in Zagreb, Yugoslavia, with pigmentation of the skin, fever, anaemia and haemoglobinuria of 5 days' duration; 11 years previously he had been splenectomized after receiving abdominal injuries in a traffic accident. The red blood count was around a million and the white blood count was 18,500 per cmm. rising even higher, while the blood showed marked haemolysis. The day after admission, anuria set in and the patient's condition rapidly

deteriorated, death supervening the next morning. Numerous extended rings and rods were found in the erythrocytes of the blood and marrow, and these were identified as piroplasms, resembling most closely *Babesia bovis*.

An autopsy was made with the following findings:—congestion of the brain and meninges, effusion of blood below the pleura and near the spine, congestion and oedema of lungs, discoloration of kidneys with disappearance of cortex. Marked hyperaemia of all organs was found on section, with piroplasms in the erythrocytes. The Kupffer cells of the liver were swollen, the kidneys showed haemoglobinuric nephrosis.

The patient came from the village of Strmec, 10 km. from Zagreb and near the river Sava. He kept cattle, and a fortnight before his illness began, cattle in the vicinity of his farm had been found to be suffering from piroplasmiasis. On his own pastures, ticks (*Dermacentor silvarum* and *Ixodes ricinus*) were numerous.

[Previous records of cases of so-called human piroplasmiasis have all been shown to be really malignant tertian malaria. In the present instance, the man came from a non-malarious district. The abstracter was shown blood films from this case, and the organisms were certainly piroplasms. On the assumption that the material came from the patient, this case must be regarded as the first human infection of piroplasms, arising perhaps as the result of splenectomy which is known to have a profound effect on the susceptibility of an animal to the disease.]

P. C. C. Garnham

SCHWETZ, J., BAUMANN, H. & FORT, M. Sur quelques parasites sanguicoles trouvés dans divers rats sauvages et domestiques de l'Est du Congo Belge. [**Some Blood Parasites found in Various Wild and House Rats in the Eastern Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1956, Oct. 31, v. 36, No. 5, 589-94.

A total of 782 wild rodents belonging to 11 different species from 7 localities in the Belgian Congo were examined for the presence of schistosomiasis. The following species were found to be infected: *Pelomys fallax*, *Dasymys bentleyae*, *Mastomys coucha*, *Lophuromys aquilus* and *Oenomys hypoxanthus*. A batch of 243 *Rattus rattus* was also examined and only 2 cases of *Schistosoma mansoni* found, in rats from Albertville, whereas in the same district several cases of *S. rodhaini* and *S. mansoni* var. *rodentorum* were found among the wild rodents.

Among other blood parasites, *Trypanosoma lewisi* was found 23 times in *R. rattus*, 3 times in *Mastomys* and once in *Dasymys*; *Trypanosoma oenomysi* 9 times in *Pelomys* and 4 in *Oenomys*; *Grahamella*, 23 times in *Lophuromys*, twice in *Mastomys* and once in *R. rattus*; *Hepatozoon* 9 times in *Dasymys* and once in *Mastomys*. *Spirochaetes*, *S. duttoni*, were found only in 25 *Pelomys fallax* from savannah country. Micro-

flariae were seen only once, in a specimen of *Oenomys hypoxanthus* from Irumu.

Edward Hindle

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

STEINHAUS, E. A. & SMITH, R. F. [Edited by.] **Annual Review of Entomology. Vol. 1.** pp. ix + 466, illustrated. [Numerous refs.] 1956. Stanford: Annual Reviews, Inc., California, U.S.A. London: H. K. Lewis & Co., Ltd., 136, Gower Street, W.C.1.

Matters of interest to medical and veterinary men are quite well represented in this first volume of the *Annual Review of Entomology*, a work which should prove over the years to be a valuable addition to entomological literature. Several articles deal with insecticides and there is one on repellents; a usefully up-to-date article is presented on veterinary and medical acarology, another on non-biting flies and disease, and one on stored product pests. The authors of these and the other sections are recognized workers in their subjects.

D. S. Bertram

DETHIER, V. G. **The Sensory Physiology of Blood-Sucking Arthropods.** *Exper. Parasit.* New York. 1957, Jan., v. 6, No. 1, 68-122. [Numerous refs.]

QUAN, S. F., HARTWELL, W. V., SCOTT, K. G. & PENG, C. T. **Cerium 144 as a Tag for Arthropods of Medical Importance.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Jan., v. 51, No. 1, 87-8.

The correspondents describe the use of ^{144}Ce for labelling arthropods as an aid to the study of their ecology and their epidemiological role. This substance has the advantage over the commonly used ^{32}P and ^{131}I [with half-lives of 14 and 8 days, respectively] of the considerably longer half-life period of 282 days; this allows longer-term studies to be carried out. The insects labelled were fleas, mosquitoes, cockroaches, kissing bugs and ticks. All were still detectable at the end of a week, and some showed little loss of radio-activity after 28 days. The simple methods of application are briefly described.

The disadvantage of this method of tagging is that the areas of release of insects so tagged cannot be used again for further studies with gamma or beta ray emitters until all the tagged insects have died, or enough half-life periods of ^{144}Ce have passed for the reduction of its radiations to background proportion. [See also JENKINS, this *Bulletin*, 1955, v. 52, 301.]

W. H. Potts

BROCCA, E. Artropodi e malattie. [**Arthropods and Diseases**] *Ann. d. San. Pubblica.* Rome. 1956, Nov.-Dec., v. 17, No. 6, 1179-91.

The English summary appended to the paper is as follows:—

“The many problems connected with the importance and the study of disease-transmitting arthropods, the new highly lethal insecticides and the dangers of indiscriminate extermination of arthropods are discussed.”

TOUMANOFF, C. & SIMOND, M., with the technical collaboration of B. BOUBACAR. Quelques observations sur la faune culicidienne de la Basse Guinée (Conakry et presqu'île de Kaloum). (Saison sèche de l'année 1956.) [**Observations on the Mosquito Fauna of Lower Guinea, French West Africa, during the Dry Season of 1956**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 667-74. [10 refs.]

Collections in the region of Conakry, on the coast of French Guinea, have revealed most of the species of anophelines found in neighbouring territories. In the dry season, the breeding is confined to permanent sites, where various species become confined until more favourable conditions allow them to expand their range again. During the dry season from the end of February to the beginning of March, *A. gambiae* has not been found gravid, though it continues to take blood meals; this suggests the existence of a short aestivation period. The data refer to typical *A. gambiae*, since *A. melas* has not been found in the dry season in Conakry in recent years because of changes in breeding sites.

The culicine fauna, in spite of the unfavourable nature of the dry season, is quite rich. Two of the species captured, *Culex ingrami* and *C. simpsoni*, do not seem to have been recorded here before. Certain types, especially *C. thalassius* and *C. decens*, are able to spend the dry season in septic tanks (with up to 460 mgm./litre chloride) in company with *C. pipiens*.

No larvae of *Aedes* spp. were found in the survey. J. R. Busvine

HAMON, J., DEVÉMY, P., RICKENBACH, A. & CAUSSE, G. Contribution à l'étude des moustiques de la Casamance. [**Mosquitoes of the Casamance Area, French West Africa**] *Ann. Parasit. Humaine et Comparée.* 1956, Oct.-Dec., v. 31, Nos. 5/6, 607-618, 2 maps & 1 graph. [10 refs.]

10 species of anopheline and 45 species of culicine mosquito are listed for the Casamance, the French territory south of the Gambia. Little has previously been done on mosquitoes of the Casamance and many of the records are new for the area. Besides locality records for species and some biological notes, the paper gives a brief account of the climate, vegetation, and topography of the territory. D. S. Bertram

HAMON, J., RICKENBACH, A. & ROBERT, P. Seconde contribution à l'étude des moustiques du Dahomey avec quelques notes sur ceux du Togo. [**Second Study of the Mosquitoes of Dahomey with Notes on those of Togo**] *Ann. Parasit. Humaine et Comparée*. 1956, Oct.-Dec., v. 31, Nos. 5/6, 619-35, 2 maps & 1 chart. [12 refs.]

HAMON, J. Seconde note sur la biologie des moustiques de l'Ile de la Réunion. [**Second Note on the Biology of Mosquitoes in Réunion**] *Ann. Parasit. Humaine et Comparée*. 1956, Oct.-Dec., v. 31, Nos. 5/6, 598-606, 3 pls.

The first contribution of this series was published in 1953 (*Mém. Inst. Scient. Madagascar*, (E), 1953, v. 5, 521). Observations made during the period 1955-56 are reported in this paper. In Réunion *Anopheles gambiae* does not appear to be able to maintain itself permanently above an altitude of 500 metres. Trials with human bait showed that the main biting activity took place between sunset and 3 hours before sunrise (0300 hours) and showed a decrease in activity after midnight. This behaviour differs from that reported from the African mainland but resembles that recorded on the island of Mauritius, and the author suggests it is a response to special microclimatic conditions found on small islands.

Few *A. gambiae* were collected biting cattle, although *A. coustani*, *Aedes fowleri* and *Culex tritaeniorhynchus* were frequent on cattle. Relatively more *A. gambiae* were found biting man. The biting curves of these species are given and also those of *Aedes albopictus* and *Culex fatigans*. *Aedes albopictus* fed mainly during the day; *Aedes fowleri* at sunset and sunrise but also during the night; and the other species fed during the night with most biting activity before midnight.

Before the use of DDT *A. gambiae*, *Aedes albopictus* and *C. fatigans* were frequently found resting indoors during the day. Examination of dwellings treated with DDT since 1951 revealed the presence of resting *C. fatigans* during the day, but the absence of both *A. gambiae* and *Aedes albopictus* [see this *Bulletin*, 1954, v. 51, 535]. However, a large proportion of *A. gambiae* were found to feed out of doors and also indoors just after sunset at a time when the human inhabitants were still active.

B. R. Laurence

SMITH, W. W. & LOVE, G. J. **Effects of Drought on the Composition of Rural Mosquito Populations as reflected by Light Trap Catches.** *Mosquito News*. 1956, Dec., v. 16, No. 4, 279-81.

"A comparison of light trap catches of mosquitoes was made from the vicinity of two permanent pool environments in rural southwestern Georgia during the months of August, September, and October in a year of normal rainfall (1942) and a year of drought (1955). An almost

complete reversal of species composition was noted. Anopheline species, chiefly *A. quadrimaculatus* and *A. crucians*, and *Uranotaenia sapphirina* composed 98.2 percent of the catch in the normal year, while in the drought year *Aedes* and *Psorophora* species, chiefly *A. vexans*, composed 97.8 percent of the light trap catches considered.

"Approximately 80 percent more mosquitoes were taken per night of light trapping during the drought year than in the normal year."

ROMAN, E., VIOLET, P. & RINAUDO, E. Destruction par l'E.P.N. des larves du moustique citadin, *Culex pipiens autogenicus*. [**Destruction of Larvae of the Urban Mosquito *Culex pipiens autogenicus* by means of EPN**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 661-7.

After successful trials in 1946, treatments of DDT were used to control *Culex pipiens autogenicus* breeding in latrines in the Lyons area. Since 1950, there has been evidence of increased resistance to this insecticide and accordingly trials of organo-phosphorus compounds have been made. The most effective for this purpose was found to be EPN (ethyl *para*-nitrophenyl thionobenzene phosphonate). Laboratory trials were made with a wettable powder and an emulsion. The wettable powder at 0.005 p.p.m. killed all larvae of a DDT-resistant strain while, at this concentration, the emulsion killed 19 out of 20. Tests with faecal matter showed that the insecticidal action was not destroyed by the contents of latrines for 5 or 6 days. On the other hand, high doses of EPN (five times the usual dose) had no effect on an anaerobic bacterial suspension from sewage and little effect on aerobic bacteria. Tests with several connected containers, containing faecal matter and larvae, showed that the EPN would gradually destroy culicines breeding in latrines with compartmented septic tanks. It was concluded that this insecticide is very suitable for destroying DDT-resistant *C. autogenicus* breeding in drains, cess-pits and latrines. The dangers in handling it are stressed, together with the need for giving precise safety instructions to the operators. J. R. Busvine

HOFFMAN, R. A. & YATES, W. W. **Control of Mosquitoes found in Log Ponds in Western Oregon.** *Mosquito News.* 1956, Dec., v. 16, No. 4, 291-3.

In experiments on the control of mosquitoes breeding in log ponds in western Oregon the authors have obtained high initial reduction of *Culex tarsalis* and *Culiseta incidens* with DDT emulsions at rates of 0.04 to 0.2 p.p.m. and practical control for 30 days at 0.1 and 0.2 p.p.m. Wettable powders were less effective and surface oils provided a good initial kill but reinfestation occurred more rapidly than with the emulsions.

Complete control of these 2 mosquitoes and of *Culex pipiens* was

obtained with 0.25 lb. of DDT or EPN in an emulsion per acre, but this dosage is probably too low for general practical application.

Certain differences between these results and those of other workers were investigated in the laboratory.

H. S. Leeson

WALLIS, R. C. & LANG, C. A. **Egg Formation and Oviposition in Blood-Fed *Aedes aegypti* L.** *Mosquito News*. 1956, Dec., v. 16, No. 4, 283-6.

GOINY, H., VAN SOMEREN, E. C. C. & HEISCH, R. B. **The Eggs of *Aedes (skusea) pembaensis* Theobald discovered on Crabs.** *East African Med. J.* 1957, Jan., v. 34, No. 1, 1-2, 2 figs.

The authors have already found filarial infection in specimens of *Aedes pembaensis* taken on the island of Patta off the northern coast of Kenya (*Trans. Roy. Soc. Trop. Med. & Hyg.*, 1956, v. 50, 421).

The mosquitoes breed in crab-holes and the authors now record that the eggs are laid in rows on the legs of the crab, along the upper part of the surfaces of the meri, especially on the anterior surfaces of the merus of the foreleg; in this last situation the eggs are sometimes scattered in groups on the surface which is interspersed with tufts of hair; one egg was also seen in an eye-socket.

The eggs are sausage-shaped and slightly curved, with the flat side attached to the crab's leg. When mature the eggs are brown and the surface shows a fine honeycomb reticulation.

The crab upon which the *Aedes* eggs are most commonly seen has been identified as *Sesarma meinerti*; this species has been caught on tidal flats near Mombasa. Specimens of this crab, freed of *Aedes* eggs, were placed in a cage containing artificially made crab-holes, seawater and large numbers of wild-caught *Aedes pembaensis*. Within one week eggs were present on all the crabs, and on many crabs the mosquito was seen laying them on a merus. During this act, the abdomen is held vertically and the mosquito moves slowly along the merus with a rhythmical sway-movement.

Larvae of *Aedes pembaensis* have occasionally been found in pools, swamps and various receptacles holding water.

H. J. O'D. Burke-Gaffney

LODDO, B. & PIRAS, L. Studio della popolazione di mosche di dieci paesi della Sardegna. [**Study of the Incidence of House-Flies in Ten Areas in Sardinia**] *Riv. Italiana d'Igiene*. 1956, July-Aug., v. 16, Nos. 7/8, 343-56, 3 graphs. [22 refs.] English summary (5 lines).

During the ERLAAS campaign against mosquitoes in Sardinia (1947-1950) [see this *Bulletin*, 1954, v. 51, 1019] the wide use of insecticides

temporarily reduced house-flies; but since the development of insecticide resistance, they have been as numerous as ever. The authors studied the population density throughout the year in 10 small villages about 40 km. north of Cagliari in the Campidano plain. Estimates of fly density were made from counts of numbers caught on sticky papers hung up in various places. These were set up on Monday, collected on Tuesday, replaced on Friday and removed on Saturday. The data, recorded throughout the year 1954, were fairly similar in all 10 localities. When they were analysed according to capture site, there were similarities in numbers in kitchens and food shops, but the curve for animal shelters was somewhat lower.

The overall picture showed very low fly numbers at the beginning of the year, with a small peak in February–March, then a decline. Numbers rose again in June, levelled off in July–August, then rose to two sharp peaks of abundance in late September and late October, finally falling sharply in November.

The authors compare these changes with meteorological data. Temperature explains summer abundance and winter decline but not the small peak in early spring and the two very high peaks in late autumn. Records of wind velocity show high values at these times and the authors conclude that the strong winds drove flies indoors and artificially magnified the estimates of fly abundance.

J. R. Busvine

BARKER, R. J. & RAWHY, Abd-El-Rahman. **Toxicity of DDT in Acetone and in Oil to Adult House Flies.** *J. Econom. Entom.* 1957, Feb., v. 50, No. 1, 105.

“At the 50% mortality level at 25.5° C., topically applied DDT was 4.2 times as toxic to adult normal house flies when dissolved in acetone as in petroleum oil. The dosage-response curves were not parallel. On resistant flies, 0.8 microgram was more toxic in oil than in acetone.

“More DDT was absorbed from acetone solution than from oil. The difference in absorption seems insufficient to explain the difference in mortality.”

MOOREFIELD, H. H. & KEARNS, C. W. **Levels of DDT-Dehydrochlorinase during Metamorphosis of the Resistant House Fly.** *J. Econom. Entom.* 1957, Feb., v. 50, No. 1, 11–13, 1 fig. [12 refs.]

“The detoxication enzyme, DDT-dehydrochlorinase, quantitatively increases during the larval period of the DDT resistant house fly. A marked reduction in the amount of enzyme, occurring at the time of pupation, may decrease the total activity up to 50%. The resultant level is maintained throughout the pupal and adult life. Protein free diets or

those supplemented with milk do not significantly affect this level in the adult fly.

"Assays on fractions of resistant fly populations selected at the time of pupation or adult emergence indicate that individuals transforming earlier at these stages contain less DDT-dehydrochlorinase than those pupating or emerging later."

SCHOOF, H. F. & KILPATRICK, J. W. **House Fly Control with Parathion and Diazinon impregnated Cords in Dairy Barns and Dining Halls.**

J. Econom. Entom. 1957, Feb., v. 50, No. 1, 24-7, 4 figs.

"Cotton cords (3/32" diameter) impregnated in a 10% parathion-xylene solution have provided satisfactory to excellent house fly control in dairy barns and in a military dining hall near Savannah, Georgia. Cotton cords of 3/32" diameter impregnated in a 25% Diazinon-xylene solution provided 6 to 8 weeks of excellent to satisfactory house fly control in a military dining hall, while similarly treated cords, 3/16" diameter, gave excellent control in a dairy for an entire season from May through the middle of October. Removal of the Diazinon-treated cord from the dairy in August caused a rise in fly densities from 6 to 133 flies per grill count in 4 weeks. Subsequent reinstallation of the same cords reduced the indices to below four flies per grill count for the balance of the season."

[See this *Bulletin*, 1956, v. 53, 816.]

KILPATRICK, J. W. & SCHOOF, H. F. **House Fly Control in Dairy Barns with Residual Treatments of Phosphorus Compounds.** *J. Econom.*

Entom. 1957, Feb., v. 50, No. 1, 36-9.

"Residual application of malathion-sugar formulations in dairies at a rate of 200 mg. of malathion and 500 mg. of sugar/sq.ft. gave 1 to 7 or 8 weeks of satisfactory house fly control in 1954-55. In the same period treatments of Chlorthion and Am. Cyanamid 4124 at 100 mg./sq.ft. plus a sugar additive (250 mg./sq.ft.) provided satisfactory house fly control for 6 to 8 weeks in 1954 and 1955. Diazinon, tested only in 1954 at a similar dosage gave 9 to 11 weeks of satisfactory control. Unfavourable weather conditions for house fly propagation in late 1954 were responsible for the extended excellent control levels present in that year. Although a lower degree of control was apparent in 1955, Am. Cyanamid 4124 and Chlorthion produced 6 to 7 weeks of satisfactory control respectively.

"Bayer 21/199 alone at 50 mg./sq.ft. and in combination with DDT (50 mg./sq.ft.) did not provide satisfactory fly control at two dairies in 1954. A single application of Bayer L 13/59-sugar formulation at 100 mg. of L 13/59 and 250 mg. of sugar/sq.ft. provided 7 weeks of satisfactory control.

"Spot treatments (50% of normal coverage) at two dairies with Am. Cyanamid 4124 resulted in poor control at one dairy and 5 weeks of satisfactory control at the second.

"By reversing the type of malathion formulations used at two dairies during successive years, it was shown that the locale rather than the formulation was the factor responsible for the difference in results."

[See this *Bulletin*, 1956, v. 53, 379.]

BRAAKSMA, H. E. **Myiasis caused by *Dermatobia cyaniventris* in Surinam.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Mar., v. 9, No. 1, 97-9.

"Myiasis, caused by the larva of *Dermatobia cyaniventris*, is a jungle disease in Surinam; town people may also be affected incidentally, usually after a stay in the jungle. The affection resembles a boil, but is accompanied by violent itching. Treatment consists of incision, followed by cautious and complete extraction of the larva."

[Four cases are listed.]

RAJINDAR PAL & SHARMA, M. I. D. **Use of Organo Phosphate Insecticides against Insects of Public Health Importance.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1956, Nov., v. 4, No. 6, 186-204. [Numerous refs.]

A review.

VUKASOVIĆ, P., BORJANOVIĆ, S. & MARTINOVIĆ, A. [**Preliminary Investigations on Resistance of Body Lice (*Pediculus humanus corporis*) against Insecticides**] *Bull. Inst. Hyg.* Belgrade. 1956, v. 5, Nos. 1/2, 1-40. [37 refs.] [In Serbian.] French summary.

The authors have utilized test kits supplied by the World Health Organization for checking the resistance levels of human lice on naturally infested persons in Serbia, Bosnia, and adjoining regions. The tests involved exposing well-fed adult lice to powders containing 0.1, 0.5, 1.0 and 5.0% DDT; also 0.25 and 0.5% gamma BHC and 0.02 and 0.04% pyrethrins. After 24 hours the lice were classified as normal, paralysed or dead. Very great variation in results with DDT were found, partly owing, perhaps, to the small number (10) of lice used in each test. In general a disturbingly high number of lice appeared to be quite unaffected at 0.5 and 1.0, and a few at 5.0% DDT; whereas the WHO suggested that normally susceptible lice should all be killed by 0.1%. The proportions of resistant lice varied in different localities, being 8, 10, 16 and even 25% of the specimens in some places.

No unaffected lice were observed after 24 hours on the BHC or

pyrethrin powders; but many of the lice on BHC (and a few on pyrethrins) were only paralysed and not dead. This suggests the possibility of incipient resistance to these insecticides.

J. R. Busvine

BUSVINE, J. R. Insecticide-Resistant Strains of Insects of Public Health Importance. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Jan., v. 51, No. 1, 11-31. [Numerous refs.] Discussion 32-6 [MACDONALD, G.; DAVIDSON, G.; MATTINGLY, P. F.; BERTRAM, D. S.; BRADBURY, F. R.; BUSVINE, J. R. (in reply)].

Although insect resistance to residual insecticides has been known for over 40 years it has become much more prevalent in the last decade. Possible causes of the increase are defects in the mode of action of chlorinated insecticides permitting the development of defence mechanisms, natural selection in the insect population exposed and widespread use of insecticides resulting in greater selection. Resistance in disease vectors has now been reported by 32 nations but the estimated number of resistant species varies according to the criteria applied; the author's estimate is 18 species belonging to 7 genera. The data regarding resistance in these species are reviewed.

It is clear that problems of resistance are growing faster than the capacity to deal with them. The major needs at present are rapid dissemination of information about resistance, standardized methods of detecting and measuring it and greater interest in the problem in research laboratories. It is not yet known whether every insect exposed for long periods to any insecticide can become resistant to it. The chances of developing resistance probably depend on 3 factors: the frequency of resistance genes in the population, the intensity of selection and the number of generations annually. It is thought that resistance genes are rare before being concentrated by selective mortality. They may be non-specific, giving rise to a generalized resistance, or specific to a particular insecticide, the former being probably dependent on multiple genes. In the house-fly more than one defence mechanism seems involved. One is an enzyme converting DDT into the harmless compound DDE, but resistance has also been shown to all DDT-like compounds. Both resistant and normal lice can degrade DDT, but in *Aedes aegypti* larval resistance appears to depend on dehydrochlorination. When resistance to one insecticide appears it develops rapidly to others, suggesting a single protective mechanism. In general the more intense the selection, *i.e.*, the greater the proportion killed in each generation, the more rapidly will resistance develop and it will accelerate as the resistance genes are concentrated. Return to susceptibility is slower and resistance can be rapidly recreated on a re-exposure to the insecticide. Laboratory studies have revealed several obstacles to selection of resistance, such as the linking of the resistance gene to others with deleterious biological effects, *e.g.*, reduced fertility.

In discussing counter-measures against resistance the author made the following suggestions. Residual insecticidal control should aim only at the level of mortality required to interrupt transmission; higher kills may tend to produce resistance. A good alternative to DDT should be kept in reserve for use in epidemics. The value of alternation of insecticides would be affected by the rate of decline of resistance after selection ceased; it would probably be 10 years before DDT could again be used against house-flies and then it would be effective only for some 2 years. Moreover, the 3 types of resistance described embrace nearly all the synthetic insecticides. The efficacy of mixtures of insecticides would depend on the extent to which the susceptibility of the insect to the two compounds was positively or negatively correlated or independent; if positively correlated selection would be more rapid. The same insecticide should not be used against both larvae and adults. In control campaigns standardized tests of the susceptibility of the species should be made before commencement and at intervals afterwards. Where generalized resistance of the species is met, increased dosage or more efficient application will overcome it, but not when the resistance is specific. Better knowledge of the mode of action of insecticides may indicate a solution of the problem, and there is always the possibility of changing to other control measures.

In the discussion which followed several interesting points were made. In some cases the resistance gene was associated with enhanced viability and some defect of fertility in the heterozygote. Resistant female *Anopheles gambiae* crossed with a susceptible male produced hybrid males with atrophied gonads, but a resistant male mated with a susceptible female produced normal hybrids which interbred freely. Increased interest in genetics is needed and it was suggested that resistance in insects tends to develop at the extremes of their range where genetical and physiological plasticity are low.

[This is a valuable review of present knowledge of resistance to insecticides and a very stimulating contribution to a subject of immense importance. An abstract cannot do it justice and it should be read in full. The findings justify the general policy put forward by WHO in 1954 [this *Bulletin*, 1955, v. 52, 510] recommending the intensive use of residual insecticides for a short period of years and then continuation of control by other means.]

T. H. Davey

BAMI, H. L. **Estimation of B.H.C. in Scrapings from Sprayed Surfaces.** *Indian J. Malariology*. 1956, Dec., v. 10, No. 4, 305-11. [22 refs.]

WASSIF, K. **On a Collection of Mammals from Northern Sinai.** Reprinted from *Bull. Inst. Désert d'Egypte*. 1953, Jan., v. 3, No. 1, 107-18, 1 folding map. [17 refs.]

WASSIF, K. & HOOGSTRAAL, H. **The Mammals of South Sinai, Egypt.**
Reprinted from *Proc. Egyptian Acad. Sci.* 1953, v. 9, 63-79, 1 map
& 1 fig. on pl. [19 refs.]

SETZER, H. W. **Mammals of the Anglo-Egyptian Sudan.** *Proc. U.S.
Nat. Museum.* Wash. 1956, v. 106, No. 3377, 447-587, 10 figs.
[34 refs.]

REPORTS AND SURVEYS

EAST AFRICA HIGH COMMISSION. **East African Virus Research Institute,
Entebbe. Report No. 6, July 1955-June 1956** [HADDOW, A. J.,
Director]. 52 pp., 1 fig. 1956. Nairobi: Govt. Printer.

The work of the Institute in 1955-56 continued to be centred mainly on yellow fever (YF) and Rift Valley fever (RVF) virus infections and on arthropod behaviour. Other investigations were concerned with encephalomyocarditis virus (Mengo), Chikungunya virus and a virus resembling the agent responsible for Nairobi sheep disease.

Experiments with YF virus (Asibi) inoculated intraperitoneally in baby mice showed that extraneural multiplication preceded localization in the brain; growth of virus in capillary endothelium may be a feature of visceral multiplication, with subsequent release of virus into the brain substance. Deaths of adult mice after intravenous injection of large doses of virus ($10^{6.5}$ LD₅₀) are irregular, virus disappearing rapidly from the circulation. Non-specific haemagglutinin (HA)-inhibitor in YF infective monkey serum was found to differ from HA-inhibitor in RVF infective mouse serum in remaining stable when stored at -24°C . Experiments to determine the period during which YF virus persists in mites (*Liponyssus galagus*) have so far failed to demonstrate that mites are infective 16 days after feeding on virus-containing blood. The results of neutralization tests on sera collected in Northern Rhodesia and Nyasaland suggest that where YF antibodies occur in the human population they may also be detected in *Galaga* spp.

The discovery that HA-inhibitor in RVF infective sera was destroyed by storage at -20°C . for a few days enabled distinctive differences in behaviour to be observed between untreated HA and HA obtained by the standard acetone-ether extraction method. RVF virus of an "incomplete" type, which did not necessarily haemagglutinate, was formed when virus in high concentration was passed serially in mice. The infective and haemagglutinating properties of RVF virus were separable by heating at 56°C . for 1 hour, which destroys HA but has little effect on infectivity.

Two atypical strains of RVF virus were isolated from mosquitoes collected near Entebbe; one was from a pool of *Aedes africanus* and the other from a mixed pool of which the virus-carrying species is believed to have been *A. (Banksinella) circumluteolus*.

In other investigations 2 strains of Chikungunya virus were isolated, one from the blood of a mosquito catcher who was suffering from fever and joint pains, the other from a suspension of *A. africanus*; the catcher had been working in the Zika Forest, where the mosquitoes were collected. A virus recovered from an epizootic in sheep was neutralized by immune serum for Nairobi sheep disease virus. In tests on 86 sera from wild birds of the Lake Victoria region, neutralizing antibodies for West Nile virus were detected in 4 specimens collected from Musophagidae (3) and Bucerotidae (1).

Entomological studies included observations on biting insects attacking small vertebrates (guineapigs and fowl), the insects being caught in a trap consisting of 2 wind tunnels with fans producing an air current across a space in which the animal bait was secured. Genetic differences affecting egg-laying in *A. aegypti* have been examined; it appears that a multiple factor mechanism is involved. It was established that the mosquito species which commonly bite man in the Entebbe area also bite birds. Catches have shown that *Taeniorhynchus africanus* undergoes a fortnightly fluctuation in numbers at times of increasing population, an observation for which no reason can at present be suggested.

This report contains much interesting information on studies which are clearly being pursued with energy and tenacity both in the laboratory and in the field.

R. S. F. Hennessey

LEBRUN, A. Quelques données biométriques et pédagogiques sur la population scolaire européenne au Congo Belge. [**Some Anthropometric and Educational Data on European Schoolchildren in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1956, Oct. 31, v. 36, No. 5, 561-76, 2 graphs.

In 1953-4 an anthropometric survey of 9,000 European schoolchildren was carried out in the principal towns of the Belgian Congo. The means and standard deviations were calculated by half years for the following: height, weight, chest measurement, and finger reach (span).

Height and weight were consistently greater at all ages than in schoolchildren in Europe, probably because of rigorous selection of emigrants and better living conditions in the Congo. Duration of stay in the tropics had a negligible effect on these measurements.

The Pignet Index of robustness [height in cm. - (weight in kgm. + chest measurement in cm.)] was lower for both boys and girls after the age of 8, indicating greater robustness in Belgian Congo children.

Duration of stay in the tropics had no significant effect on the date of onset of menstrual periods.

There was a marked retardation in scholastic prowess in the expatriates. This was to some extent caused by reduced hours of study and the unsettling effect of home leave.

M. L. Thomson

BOOK REVIEW

LAPAGE, Geoffrey [M.D., M.Sc., M.A., M.Inst.Biol.]. **Mönnig's Veterinary Helminthology and Entomology.** 4th Edition. pp. xv + 511, 24 pls. & 252 figs. 1956. London: Baillière, Tindall & Cox, Ltd., 7 & 8 Henrietta Street, W.C.2. [42s.]

The third edition of Mönnig's *Veterinary Helminthology and Entomology* was published in 1947. Since then considerable advances have been made in our knowledge of the parasitic diseases of animals, and for some time past the need for a further edition of this book, which has become a *vade-mecum* for several generations of students of veterinary science, has been appreciated. This fourth edition which has been undertaken by Lapage is therefore timely.

To revise another author's work is no easy task but Lapage has achieved his purpose. Section I, which deals with general aspects of parasitology, has been rewritten and provides an account of host-parasite relationships which is valuable to medical and veterinary workers alike. Section II, which deals with helminth parasites, has been revised. There are, however, some omissions in this section, particularly in regard to anthelmintics. The piperazine derivatives, for example, which are now well established as highly efficient ascarifuges in domestic animals, receive only scant attention. This is a minor criticism, however, for the value of these drugs has only recently been recognized. As the author emphasizes in his preface, knowledge is advancing so rapidly that it is scarcely possible nowadays to bring a scientific book strictly up to date, having regard to the time interval involved in its preparation and printing. The most extensive revision is to be found in Section III which concerns entomology. Here the terminology has been greatly altered in accordance with modern nomenclature, and the methods of control of the important external parasites and arthropod vectors of disease are brought up to date. The uses of the synthetic insecticides, which were described only very briefly in the third edition, have been given in greater detail.

The medical reader will find much of interest in this text-book, particularly in regard to those helminths and arthropods which are transmissible from domesticated animals to man. A few important examples will suffice to illustrate the scope of the work in this connexion.

Among the Platyhelminthes the schistosomes of domesticated animals, particularly *Schistosoma japonicum*, are considered at length. *Opisthorchis* spp. are dealt with adequately. Much useful information is to be

found on *Taenia saginata* and on *T. solium*, with special reference to prophylactic measures. In the chapters dealing with cestode infections of dogs, *Echinococcus granulosus* and *Diphyllbothrium latum* are considered, and control, including the use of anthelmintics, is discussed.

Among the Nematoda, *Trichinella spiralis* is covered fully, especially in regard to the thermal death point of the cystic stage under various abattoir practices. The ankylostomes are considered in detail and several examples are given of the aberrant cutaneous migrations undergone by the larvae of these and other parasites (both helminth and arthropod) in unnatural hosts, including man.

Although the book is written primarily for the veterinarian, it provides such a wealth of information on many, if not all, of the helminth and arthropod parasites of domestic animals which are known to be transmissible to man that reference should be made to it by any medical worker who is interested in the zoonoses and comparative pathology.

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